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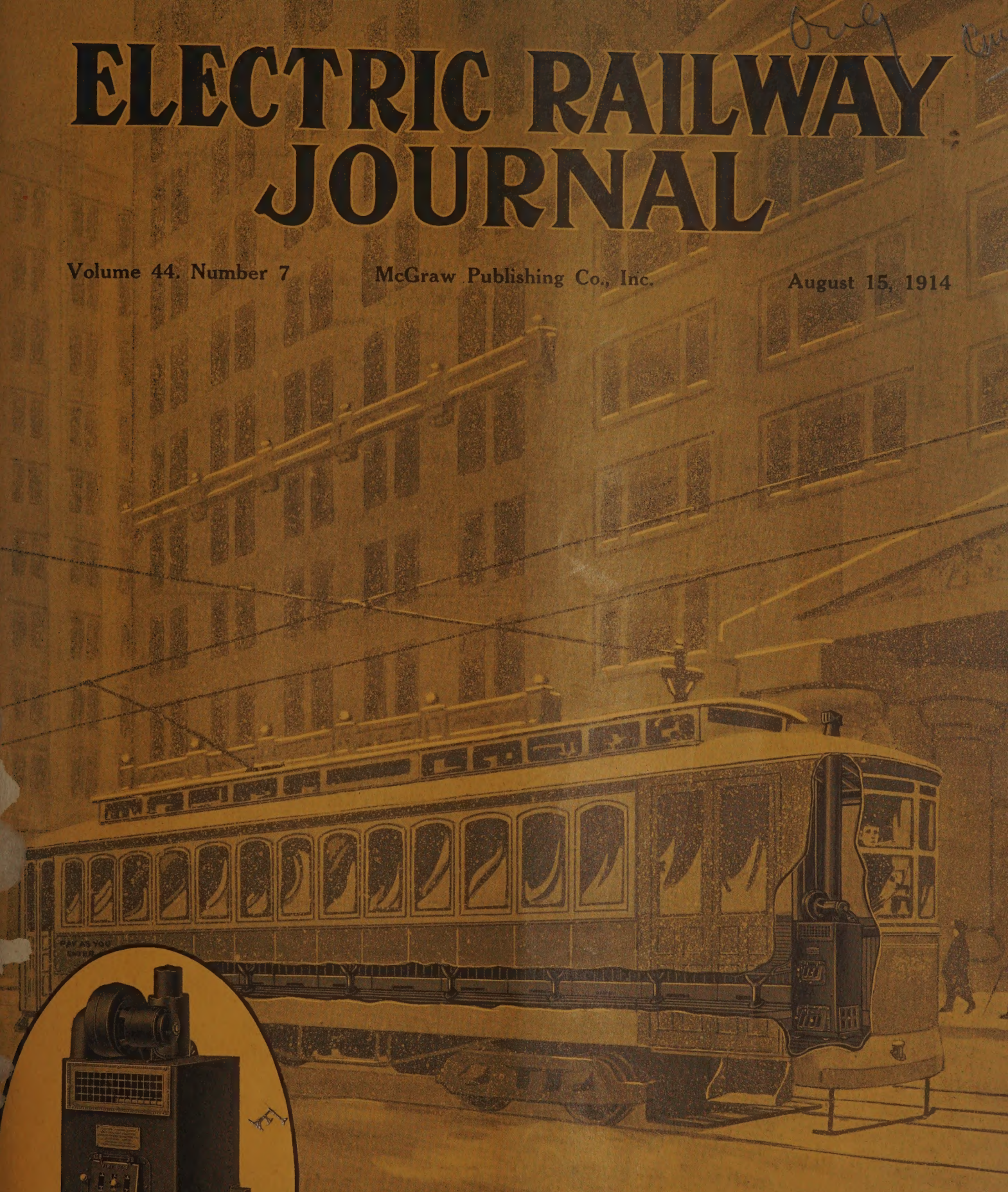

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New York, August 15, 1914

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W. C. Lancaster describes the locomotives and motor cars for this 2400-volt d.c. electrification. The locomotives are similar to the Butte design but are geared for a speed of 45 hp-hr. The motor cars are of steel for suburban high-speed service.

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Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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FINING RAILROAD TRESPASSERS IN ILLINOIS

The move to arrest and fine all trespassers on Illinois railroad property, recently made by the Public Utilities Commission of Illinois with the consent of Governor Dunne, cannot be commended too highly. To this end municipal and railroad authorities have been instructed to arrest all trespassers. While railroads, both steam and electric, have taken every possible precaution to reduce the number of trespassers to a minimum, they have not been aided by the state or local authorities. Accordingly, this move is of great importance to them, and it is to be hoped that it is merely the beginning of a national campaign. When it is considered that more than one-half of the people killed by railroads in the United States are trespassers, it should be cause enough to make trespassing not only illegal but subject to fine. The fact that these trespassers illegally were on dangerous ground did not serve as sufficient notice to keep them from using railroad right-of-way as public thoroughfare. On the other hand, railway companies are being forced to take every precaution to protect their passengers, hence it seems right and proper that the public should be forced to protect itself in this matter.

DISCUSSIONS ON THE WAR

One of the companies in a large city has given instructions to its trainmen to refrain from discussion of the war. The very good reason stated by the management is that as this is a nation with many elements of foreign birth or descent in its citizenship, disputes may arise easily from casual remarks and the final result might be an outbreak of some nature. The motive behind the order is the same that has led to the discouragement of public gatherings in a large city by adherents of one side or the other. If neutrality is to be preserved successfully, the responsibility for this safe policy will lie not only in the executive officials of the government but also in the rank and file of the population. It is plain that if the confidence which both factions in Europe now appear to have is succeeded, as is likely to be the case soon, by a realization that the cause of one is desperate, there may be an effort, both from Europe and from sympathizers in this country, to drag this nation into the conflict. Neutrality is easy to preserve under the present conditions, but it may be less easy if pressure should be directed against this country. It is hard to restrain trainmen from expressing their feelings, but in observing the strict neutrality which should prevail, it is desirable that the dangers of the contrary course be appreciated. Trainmen are in close contact with the public at all times and will be provoked or tempted to reply to sallies. Later, when bitterness succeeds the first sentiments of surprise and horror inspired by the war, it will be still harder to keep from talking. Whether or not companies issue strict orders to their men in this matter, they will improve their own position with the public by discouraging argument with passengers.

EXPORT TRADE DURING WAR

The present European war should eventually redound appreciably to the benefit of American manufacturers. The countries now involved in war have in general been our smallest patrons of electrical apparatus, owing chiefly to the operation of protective tariffs. The exception to this is England, where American manufacturers have been compelled to meet the competition of German exports. On the other hand, Canada, Japan, Mexico, South America, South Africa, East Indies and China have all been good customers, and we still have access to their markets. If the English admiralty plans result in keeping the high seas clear for English shipping, our manufacturers will probably do a fairly large export trade with that country, for supplies from Germany will be held back by blockade. There are some latent possibilities in Italy also, provided the Italians succeed in maintaining their condition of neutrality in Europe. The export trade in strictly electrical goods from America has reached a height of more than $25,000,000 a year. During the last year or two a slight tendency toward a decline has been in evidence, but exporters have generally looked upon this as a sympathetic reduction caused by a general falling off in the volume of world trade. The present closing of the purchasing markets of Europe affects so small a percentage of our total export trade in electrical appliances that it can easily be omitted from calculations. On the other hand, in the opinions of those who have studied the subject, the electrical export trade of America, which last year reached a total of about $25,000,000 should greatly increase during the next twelve months.

PROBLEMS TO BE SOLVED

Before the present opportunity for increasing our electrical export trade can be fully grasped, there are certain problems that must be more fully solved, such as that of packing goods for foreign shipment and that of establishing better credit relations abroad. The safe packing of goods has been a

particularly persistent and annoying problem of American shippers in connection with South American trade, but this should not be a difficulty that would long baffle American ingenuity. Much emphasis also has always been placed upon the advantages enjoyed by our European competitors, especially in South America, by virtue of their longer credits. During the last few years, however, European and American manufacturers have been brought much closer together in the matter of credits. The Germans have displayed a tendency toward a retrenchment from a previous rather excessively liberal policy regarding credits, and American merchants have shown an appreciable relaxation from their former rigid cash policy. Our principal commercial agencies have established branches or chains of correspondents throughout South America, and some of our largest banks have developed their own foreign credit departments. It must be admitted that the average merchant has not yet been clearly educated up to using our existing South American credit system and European manufacturers still have the advantage of service by branches of important home banking institutions. Nevertheless, the progress that has already been made in South America in the face of competition, seems to us an auspicious sign of the complete development that should now take place in the face of the present restricted competitive market.

THE SPECIFIC VERSUS THE GENERAL

A most striking contrast exists between the majority report regarding the Crosser bill for the government ownership of electric railways in the District of Columbia, abstracted in the ELECTRIC RAILWAY JOURNAL of July 4, and the report recently submitted by the minority members of the District committee. Whereas the bulk of the majority report (thirty out of thirty-five pages, to be exact) was devoted to a general exploitation of economic theories regarding public ownership and only 2 in. to an unsupported conclusion of seven points concerning the District railways, the minority report confines itself specifically to the proposed bill, its faulty construction and the advantages claimed by its proponents. The majority report is at best an incomplete and unauthoritative discourse on the general principle of government ownership, while the minority report is a complete analysis of the proposal, good or bad, as it relates to the matter actually under consideration. In other words, it deals with the facts. This difference is worthy of note as being characteristic of two modes of thought—the loose and the analytical.

The first part of the minority report deals with several aspects of the faulty construction of the Crosser bill. The point covering the obligation of the city to take over the railways at an award to be made by the Public Service Commission, whether excessive or not, is particularly interesting in view of the fact that out of the total fifteen witnesses in favor of the bill only four discussed the question of cost. As pointed out, it is impossible at present to ascertain what a condemnation award would amount to, but the minority members are quite correct in their assertion that in the light of current decisions the supporters of the bill have no reason for expecting the award to be limited to a bare physical value, exclusive of going concern allowances. Moreover, it is pointed out that the street railways operating within the District of Columbia extend beyond the limits of the District into a territory over which the federal government has no jurisdiction. The commission is empowered to condemn the outlying lines, but no intelligent method has been suggested for so doing and no indication made of the cost that would result.

The loose construction of the entire bill is also exemplified by Section 9 and Section 10. The first of these provides for the operation of the condemned railways under rules not in conflict with existing acts of Congress. Whether the railways would thus become amenable to all existing laws pertaining to the District is a matter of conjecture, but the efficient electric railway manager would not desire even to admit the possibility of employees receiving thirty days' leave with pay annually and thirty days' sick leave annually, and that purchases over $25 in amount should be placed in federal government hands. Section 9 authorizes the appropriation of $50,000 out of the District funds for the expenses of the condemnation proceedings, an appropriation which is not to be reimbursed out of the sale of bonds and which, in the light of the $1,000,000 paid by the City of Holyoke, Mass., for condemnation proceedings to acquire its gas and electric plants, is palpably absurd. It does not require much discernment to see in this very section the entering wedge for a continual chopping into the District funds for money to run the railways under government ownership.

The second main division of the report is devoted to a general refutation of the local advantages of government ownership so nonchalantly asserted by the majority section of the committee. To use the latter's own words: "The experience of the British Isles with city operation of street car lines shows what may be reasonably expected to be the experience here." We had supposed that every schoolboy recognized the worthlessness of the device of analogy as a means of proof except in cases where absolute similarity of structure, education or environment could be shown. Why this fundamental principle of argumentation should be so slighted by representatives in our national halls of debate is certainly not comprehensible. As we have often stated in these columns, the political conditions and ideals in Great Britain and Germany do not obtain in this country, and with all the assumptions one may care to make regarding these countries, no valid argument may be derived in support of the trial of the proposition here.

We are not compelled to be content with such a general rebuttal of the contention of the committee majority, however, for the minority group has taken up one by one and, as far as is possible in a few words, punctured the advantages of municipal ownership for

Washington claimed by the advocates of the bill. Neither in public nor in private operation can there be found any reason for asserting that municipal ownership in Washington would result in a great reduction of fares, or a large increase in wages to correspond to the San Francisco Municipal Railway wages. Even if the railways were bought at the absurdly low $25,000,000 valuation of the parent of the bill and the burden of taxes were dodged by shifting it to the other taxpayers of the District, the granting of the wage increase which has been dangled in the report would mean an annual deficit of more than $250,000, and fare reductions would make the financial disaster still greater. If the railways were bought at any price tending to equal the present market value of the securities, a deficit would be quite possible without either reduction in fares or increase in wages. In regard to improved service and extensions of lines, the minority report pertinently points out that no admissible testimony was offered at the hearing in regard to complaints along these lines. If these or other conditions, such as those of labor and publicity, are now unjust, as the minority members do not believe, then the Public Service Commission should be required to carry out the functions for which it was created.

It is said that universal transfers are desired in Washington. The minority members of the committee frankly say that the city is entitled to this improvement at the earliest possible moment, but they also point out that the Public Service Commission has ample authority to compel free transfers if the railways can afford them. If the excessive cost of such service can be proved, however, it is obvious that universal transfers under municipal ownership would be established only at the expense of other service and at the sacrifice of needed income. If the District of Columbia commissioners realized more deeply their important position as impartial arbitrators between the utilities and the public, as did the New York commissioners in the recent Brooklyn transfer case, they might take some steps to find out the financial possibility of a universal transfer system instead of spending their time in blind advocation of the theory of municipal ownership.

It would be impossible to leave the minority report without referring to the light it throws upon the state of public sentiment in Washington regarding the proposed bill. It may be recalled that one of the witnesses, as previously mentioned in the ELECTRIC RAILWAY JOURNAL, stated that the people of Washington were "overwhelmingly" in favor of the bill, but that during a four-hour session, even though assisted by a city directory, he could name only sixteen people who favored government ownership, four of these being the three public service commissioners and the corporation counsel. Just as entertaining as the above incident is the fact that after repeated invitations, public notices of meetings and prolonged meetings, only fifteen of the 350,000 citizens were interested enough to testify in favor of the bill, and of these fifteen only four were taxpayers, and these four represented a property valuation of only $23,197 out of the total of $380,000,000.

STEEL SHEATHING FOR CAR SIDING

A surprising diversity of opinion exists in regard to the most desirable thickness for the sheet steel that is now so generally used for the side sheathing between the sills and belt rails of electric railway cars. In the case of the semi-steel car, the sheathing on each side acts as a girder supported on the body bolsters to carry the weight of the car body without the aid of side or center sills. The girder has to be reinforced by the belt rail along its upper edge, as the inherent stiffness of such a member is a feature of importance. This may account for the fact that with cars of side-girder construction a thickness of side sheathing of ⅛ in. is widely used, although many cars of this type, notably those of the Chicago Railways and the Pittsburgh Railways, have a side-sheathing thickness of 3/32 in. However, in the case of all-steel cars, side sheathing of ⅛-in., 3/32-in., and 1/16-in. plate seems to be used indiscriminately.

The use of ⅛-in. plate for side sheathing undoubtedly originated from a belief that this was a minimum workable thickness, and that in city service safety against collisions with the poles or wheel hubs of vehicles demanded more resisting power than was supplied by very thin sheets of steel. However, that the use of even 1/16-in. side sheathing is permissible is demonstrated by the stepless cars of the New York Railways. These cars are now being operated upon Broadway in New York City, where the traffic is exceptionally congested, and notwithstanding the very low sides necessitated by the stepless design no difficulty on account of puncturing the 1/16-in. side sheathing has been experienced.

In these cars, of course, the side sheathing does not act as a girder in the commonly accepted meaning of the term. Instead, the entire car side acts as a truss, of which the belt rail is the compression member, and the side sill, which is composed of a 3-in. angle, acts as the tension member. Therefore the side sheathing, when it enters into the truss action of the side at all, is in tension throughout its entire width. No doubt the sheathing, in this case, acts as a gusset plate to hold the posts and belt rail square, but in general the difficulty of riveting such a thin sheet obviously limits its action except for short distances away from the stiffening members.

Certainly the successful operation of the New York cars upon one of the most congested thoroughfares in the country disposes of the argument, so generally heard in favor of ⅛-in. sheathing, that a thinner sheet will not afford the required protection against vehicles. As a corollary, the argument that strains need not be carried up to the letter board or plate also fails, and with it disappears the only logical reason for the popularity of the side-girder construction as opposed to one of all steel. However, even where the side-girder construction is retained there seems to be no longer any good cause for carrying 250 lb. of extra weight in two girder plates that are ⅛-in. thick when it has been so thoroughly demonstrated that 3/32-in. plates will satisfactorily serve the same purpose.

Single-Unit Power Plant and Substation at Alton, Ill.

The East St. Louis & Suburban Company Has Completed a Unique Addition to Its System Which Is Tied in with the Existing Steam Station and the Keokuk Hydroelectric Development

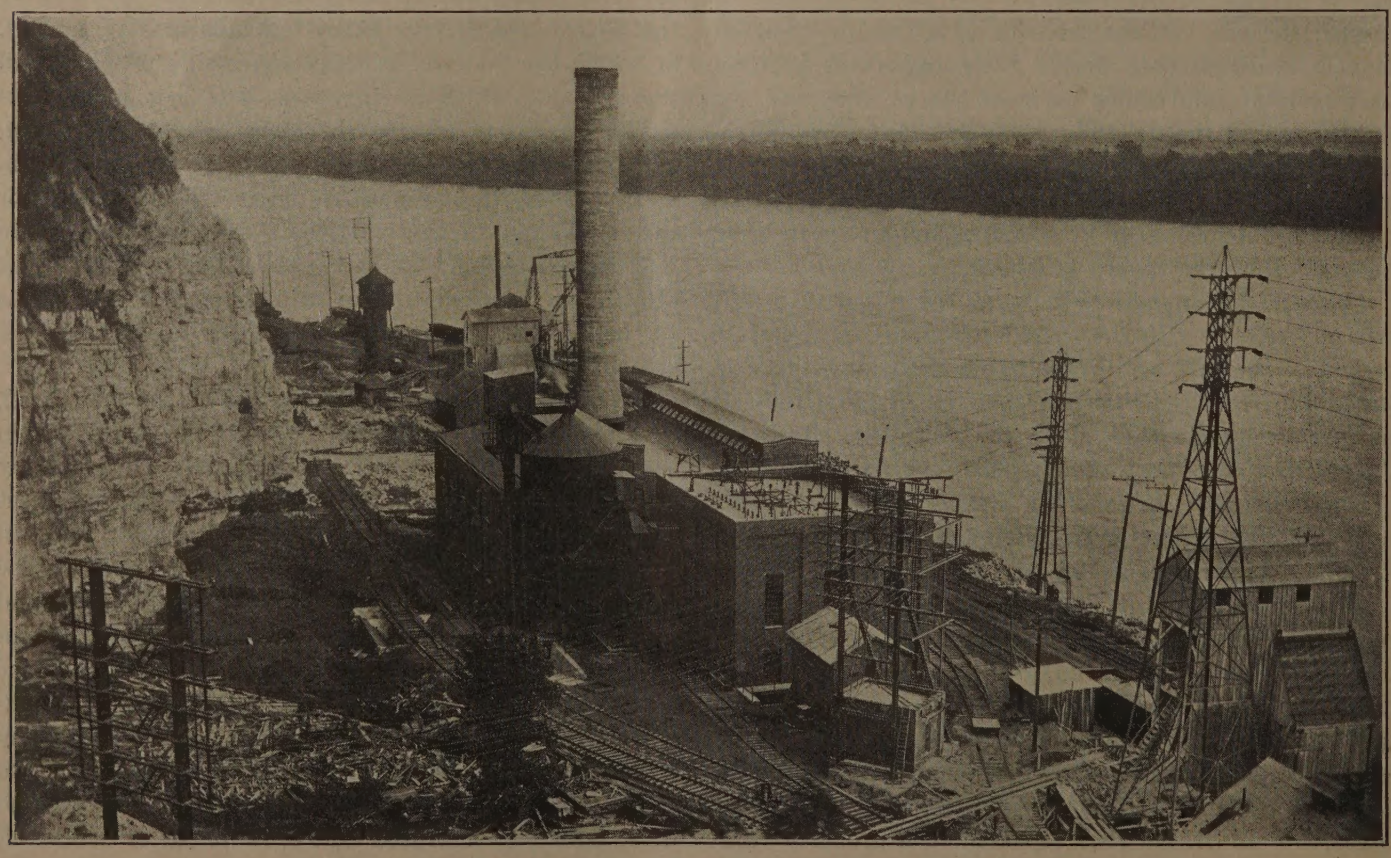
An addition to the generating system of the East St. Louis & Suburban Company, which is replete in unique features, has just been completed at Alton, Ill. Essentially, this installation includes a single-unit, 5000-kw steam generating plant supplying power to the railway, lighting and power transmission and distribution system, and a 6000-kw substation connected through a 66,000-volt a.c. transmission line with the hydroelectric plant at Keokuk, Ia. The power from the steam and the hydroelectric stations is transformed to 13,200 volts, and the lines connect with those from the Winstanley steam station of this company at East St. Louis, Ill. Power is supplied to 185 miles of city and interurban lines radiating from East St. Louis, Ill., as well as to lighting and power circuits in the territory served by the railway system. At Alton is also a terminal house from which transmission lines, carried on steel towers, lead to East St. Louis, a distance of 27 miles.

Steam Station Arrangement

A fireproof building on concrete foundations with red pressed-brick walls, and floors and roof of ferro-inclave concrete construction, houses the steam station generating units. This building is divided into generator room and boiler room, each provided with a basement. In the engine room, 42 ft. x 112 ft. in size, is a 6250-kva 600-volt, twenty-five-cycle, General Electric generator, driven by a five-stage, horizontal Curtis turbine operating at 1500 r.p.m. The neutral of the generator is grounded. The generator terminals are connected to a three-phase, 3125-kva auto-transformer, which steps up the voltage to 13,200, and the high-tension terminals are connected, through a three-phase, 300-amp, 15,000-volt oil switch, to the 13,200-volt bus in the substation. The station is designed for an ultimate capacity of 10,000-kw and, with but slight changes, it can be arranged to house machinery of double this capacity. Practically two-thirds of the generating room is occupied by a synchronous condenser, two frequency changers, two synchronous converters, two motor-driven exciter sets, a steam-driven exciter, switchboards and control apparatus. An overhead, 30-ton, electric traveling crane serves the entire generating room.

Motor-Driven Vertical Pumps

An Alberger 8200-sq. ft. Spiroflo surface condenser, installed beneath the turbine, is connected to it by a 52-in. x 17-in. expansion joint. Circulating water is supplied to this unit through a syphon-type system, and is lifted from the Mississippi River by an 18-in. vertical centrifugal pump, driven by a 100-hp, 250-volt, d.c. variable-speed motor located on the engine-room floor. This pump has a capacity of 9000 gal. per minute against a total head of 16 ft. when operating at 395 r.p.m. Since the Mississippi River is free from sand bars and other obstructions at this point, it was possible to lay the 18-in. intake pipe, fitted with flexible joints, directly on the river bottom. To prevent large particles of foreign matter from entering the intake system, however, the end of this pipe was provided with a coarse screen, and in addition a twin strainer was placed inside the station. In order to provide for



EAST ST. LOUIS & SUBURBAN PLANT—GENERAL VIEW OF PLANT AND SURROUNDINGS

variations in the load on the turbine and in the stage and temperature of the river water, the motor driving the circulating water pump was chosen to permit a variation in speed from 350 r.p.m. to 750 r.p.m. A rotary dry-vacuum pump, 12 in. x 30 in. x 18 in. in size, handles the non-condensible vapor in the condenser, while a steam-turbine-driven, hot-well centrifugal pump removes the condensate from the condenser and lifts it to the overhead feed-water storage tank in the boiler room.

125-250-Volt Exciters

As it was desired to use 250 volts d.c. for the motors driving the circulating pump, the coal-weighing hopper and the traveling crane, three-wire, 125-250-volt exciter units were selected. There are three 75-kw exciter sets, two driven by 220-volt, three-phase, twenty-five-cycle induction motors, and the third by a steam engine. Double exciter buses were installed so that a portion of the machines may be excited from one bus while the others receive their excitation from the second bus. The exciters were so connected also that they can supply power to the station lighting system in emergency. A storage battery used in the operation of the remote-control oil switches is also connected to automatically supply energy for switchboard lighting when the station voltage falls below a predetermined limit.

Synchronous Condenser for Power Factor Control

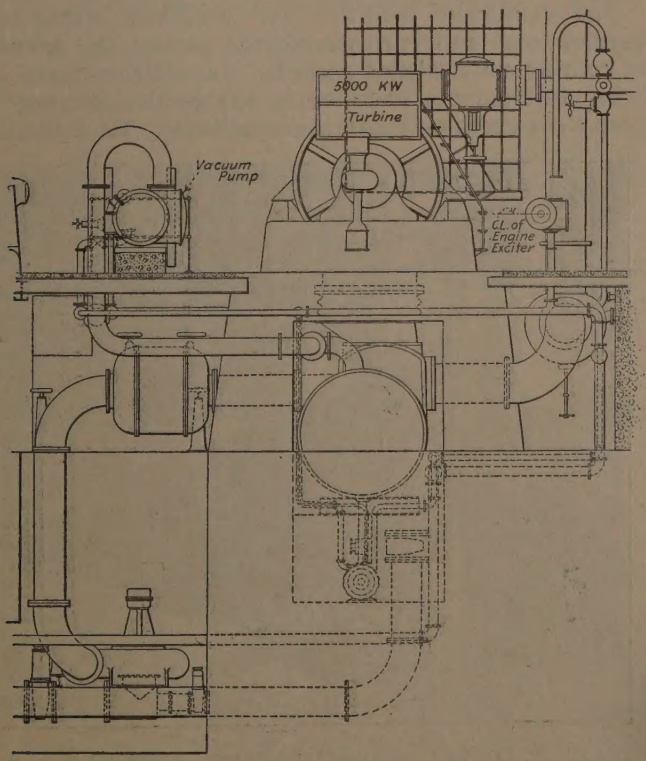
The substation equipment located in the power plant includes a 13,200-volt synchronous condenser connected to one section of the ring bus and designed to permit the maintenance of constant potential and high power factor on the railway end. There are also a frequency changer rated at 500 kw and another rated at 1000 kw, used to supply fifty-cycle power for motor service and light in Alton, and a 500-kw, 600-volt synchronous converter for railway lines in Alton. Another converter of the same capacity has been provided for.

Switchboard Arrangement

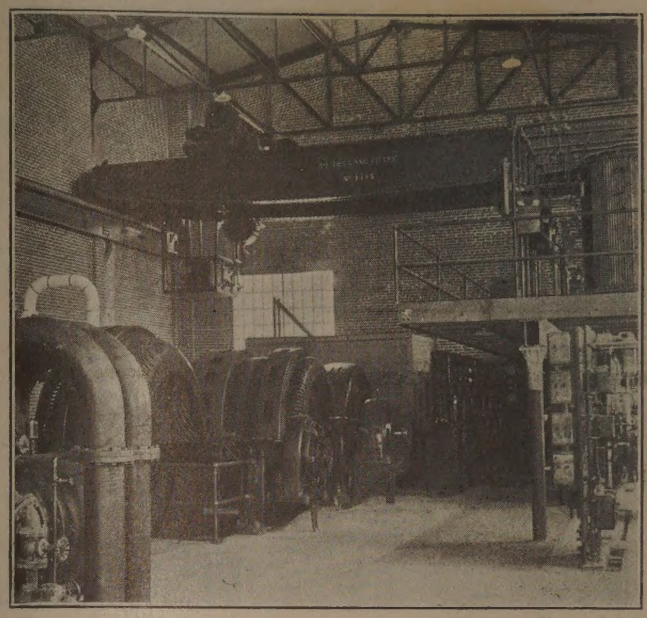
The twenty-five-cycle switchboard is divided into five sections, namely, one controlling the twenty-five-cycle, 13,200-volt equipment and the twenty-five-cycle 66,000-volt equipment; another the sixty-cycle, 2300-volt equipment; a third, the 600-volt d.c. railway unit, and a fourth for the arc lamp and the exciter sets. The fifth is a twenty-five-cycle, 220-volt panel for controlling the low-tension a.c. circuits to the various motor-driven auxiliaries.

Each panel is a separate pedestal separated from its neighbor approximately 4 ft. Seven pedestals with the synchronizing post, have been installed. One post at the end of the row of pedestals supports a swinging bracket carrying a synchroscope, a frequency indicator and two voltmeters. One of the voltmeters is so arranged that it can be connected to any section of the twenty-five-cycle buses, while the other can be plugged into any machine or into the outgoing lines.

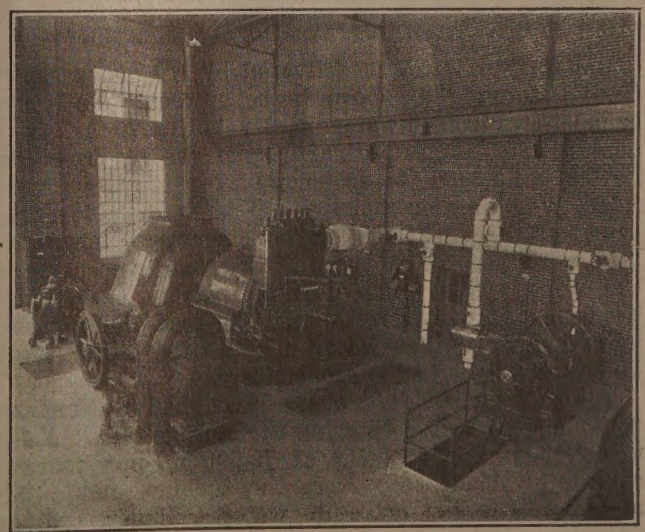
Switchboards for the sixty-cycle a.c. and the d.c. railway feeders, the exciter and the synchronous condenser face the switchboard. A balcony over both switchboards carries the oil switches for the sixty-cycle, 2300-volt lighting and power feeders. This balcony also accommodates the transformer and switching equipment for the series arc and the incandescent lighting circuits.



EAST ST. LOUIS & SUBURBAN PLANT—DETAILS OF TURBINE CONDENSING EQUIPMENT



EAST ST. LOUIS & SUBURBAN PLANT—FREQUENCY CHANGER END OF TURBINE ROOM



EAST ST. LOUIS & SUBURBAN PLANT—TURBO-GENERATOR AND AUXILIARIES

EAST ST. LOUIS & SUBURBAN PLANT—SWITCHBOARD SECTION

NATURAL AND INDUCED DRAFT SYSTEMS

A battery of four 440-hp B. & W. boilers, equipped with superheaters, comprises the steam-generating equipment in the boiler room, which is 57 ft. x 96 ft. 6 in. in size. These boilers are designed to operate at 100 per cent overload, thus making the actual total rating 3520 hp. Steam is delivered to a single header at 175-lb. gage pressure with 100 deg. superheat. This header in turn serves all the steam units in the station. Each boiler is equipped with four chain-grate stokers, driven by 3-hp, 220-volt, three-phase, twenty-five-cycle individual motors. The battery is also served by two economizers, having 4018 sq. ft. of heating surface each, and so arranged that ordinarily the gases from two boilers pass through each economizer. The feed-water piping is so connected to the economizers that they are operated in parallel.

Under light loads a 12-ft. x 150-ft. concrete stack will serve the present boiler equipment, but for heavier loads and quick firing a supplementary induced draft fan, driven by a 12-in. x 30-in. Corliss engine, will be used also. This fan will deliver 1000 cu. ft. of air per minute when running at 100 r.p.m. Provision for quick firing was made also as a precaution against interruption in the power supply from the hydroelectric plant.

FEED-WATER SUPPLY AND MEASUREMENT

Boiler feed water is delivered by a gravity system from a storage tank above the boiler room, to a Hoppes exhaust-steam feed-water heater with 625 sq. ft. of heating surface. Ordinarily the water from this heater is pumped to the boilers by a 17-in. x 10-in. x 17-in. Worthington duplex pump of the outside packed type. In cases of light load or emergency, however, a 9-in. x 15-in. x 10-in. pump of the same type performs the work. This pump during ordinary operation is used only for boiler washing. The feed-piping system is arranged so that water may be fed either to the boilers direct or to the economizers.

All of the boiler feed water is weighed by Hammond water meters before entering the storage tank. A 4-in. meter, having a capacity of 75,000 lb. per hour, receives the condensate from the turbine, and a 3-in. meter weighs the make-up water. Under ordinary operating conditions the make-up water is supplied by the cooling water from the turbine bearings and the dry-vacuum pump jacket. Provision is made, however, so that water from the house piping system will be cut in automatically through this 3-in. meter, if the water in the storage tank falls below a predetermined level.

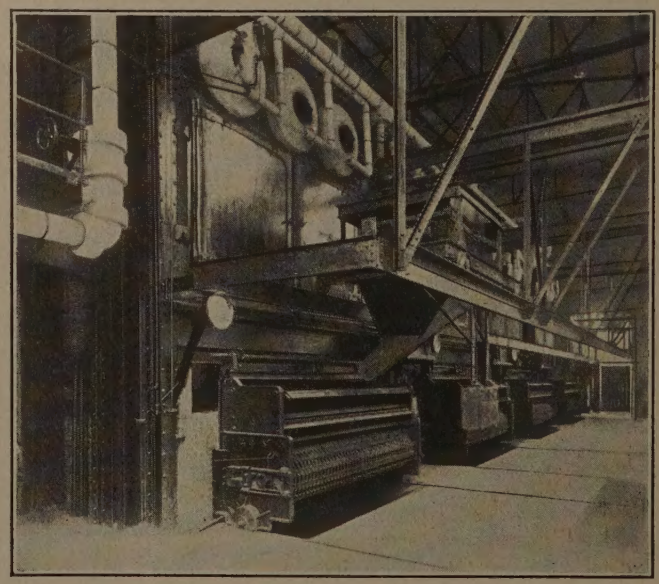
COAL SUPPLY AND MEASUREMENT

Although the East St. Louis & Suburban Railway transports large quantities of coal from the Illinois fields into East St. Louis, it was found more economical to deliver coal to this steam plant by a steam-road connection than to extend the company's own line to the station site for this purpose. Provision for receipt of coal include one track for loaded cars and another for empty ones. In installing these tracks a descending grade to the coal hoppers was provided so that loaded cars could be moved by hand. This same grade permits the "empties" to roll down to the end of the track whence they are removed by the switch engine. All coal is received in bottom-dump cars, which discharge into the track hopper. From this point it is picked up by a flight conveyor and carried to a motor-driven motor or, in case crushing is unnecessary, direct to the bucket elevator, in which it is elevated to a 300-ton steel, concrete-lined storage bunker located just outside the station at the end of the boiler room.

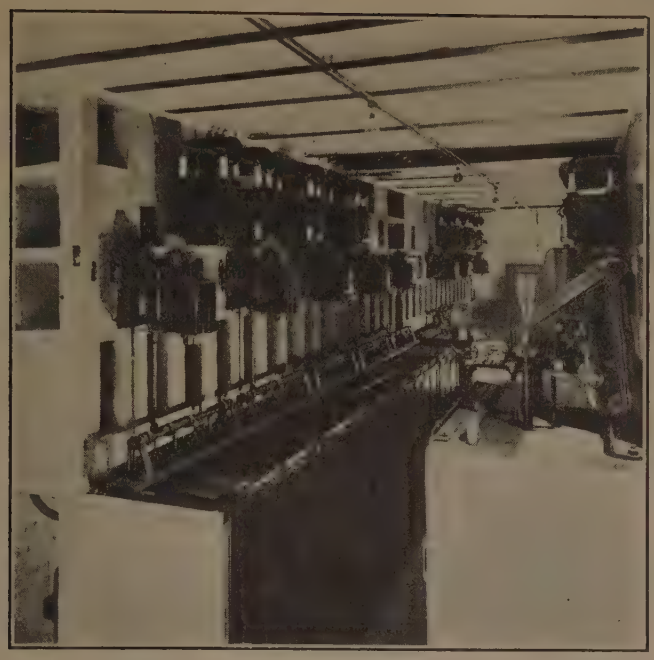
Coal from the bunker flows by gravity into a 2-ton traveling weigh hopper, which is driven by a 2-hp, 250-volt, 1250-r.p.m. d.c. motor, controlled by chains suspended within reach of a man on the boiler-room floor. This hopper is supported on an overhead track immediately in front of the boilers, and discharges coal into the stoker hoppers. Attached to this hopper is weighing apparatus which automatically records the amount of coal dumped into the stoker hoppers. Fine coal and ash from the chain-grate stokers are carried by a chain-drag conveyor and bucket elevator to separate hoppers supported on the same steel structure with the coal-storage bin. The fine-coal bin is so placed that this coal can be discharged into the coal-weighing hopper and again fed to the stokers. The ash hopper is placed above the track so that an empty coal car may be placed beneath it for loading.

DAILY BOILER TESTS

The combined facilities for weighing water and keeping coal and furnace records permit the keeping of continuous efficiency records. In addition there are other instruments installed to enable the company to keep close check on operating conditions. Each furnace



EAST ST. LOUIS & SUBURBAN PLANT—VIEW IN BOILER ROOM



EAST ST. LOUIS & SUBURBAN PLANT—REMOTE-CONTROLLED SWITCHES AND BUSBAR COMPARTMENTS

is furnished with an Ellison differential draft gage; a combination indicating recording and draft gage is so piped that it may serve any or all furnaces, and recording instruments have been installed to record the temperatures of water from the storage tank, the exhaust heater (giving the temperature of the water furnished to the economizer) and each economizer. Instruments also record the temperatures of the gases to and from each economizer, exhaust steam from the turbine, condensate from the condenser, and circulating water from the condenser. The chart for the exhaust steam thermometer record also contains those of temperature and vacuum. The temperature of the circulating water entering the condenser is determined by an indicating thermometer, since it is practically constant.

Substation with Two Sources of Energy

A substation of the same general construction has been erected at the west end of the steam station building. Incoming and outgoing 66,000-volt lines and outgoing 13,200-volt railway transmission lines terminate in this building. The outgoing 66,000-volt line is carried on steel towers of special design, furnished by the Archbold-Brady Company, to the company's substation in East St. Louis. This line is brought through the Alton substation so that all of the 66,000-volt a.c. power received from the Mississippi River Power Company can be measured. There are two 13,200-volt, twenty-five-cycle lines connecting this station with the East St. Louis substation at Lake Avenue. Provision has been made for two 13,200-volt, twenty-five-cycle lines to connect this station with local points in order to supply power to the city and interurban railway lines. But one of these has yet been installed. All of the a.c. transmission lines entering and leaving this substation pass through air-brake switches, the wires entering through bushings mounted on the roof.

The substation building is divided into three rooms; one each for transformers, 66,000-volt switches and 13,200-volt switches. Lightning arresters for incoming and outgoing 66,000-volt a.c. lines and outgoing 13,200-volt lines are installed on a balcony above the 13,200-volt switch room. Two three-phase, twenty-five-cycle, 3000-kva transformers; a three-phase, twenty-five-cycle, 3125-kva auto-transformers; two 13,200/220-125-volt auxiliary transformers, and potential and current transformers for the 66,000-volt metering equipment, are installed in the substation. In the 66,000-volt switch room an oil switch is connected between the incoming line and the bus. One 66,000-volt oil switch is connected between this bus and the 66,000-volt outgoing line to East St. Louis, and an oil switch is provided for each of the 3000-kva transformers.

All remote-control oil switches are installed in the 13,200-volt switch room. The view of this room, reproduced herewith, shows a narrow alleyway with concrete walls on either side. The ring bus is divided into four sections, two of which are carried on each side of the room, supported in concrete compartments. It has been possible by the use of this plan to economize in floor space. In width the room containing the 13,200-volt electrical apparatus is but 13 ft. from wall to wall with an alleyway down the center, 3 ft. 8 in. wide. In the concrete compartments the oil switches occupy the lower cells, while the switch solenoid operating mechanisms are mounted on the front walls of the compartments containing the buses. Cables connecting these switches with the machines and switchboards of the steam station are carried between the two buildings in underground clay conduits.

Terminal House Arrangement

The terminal house was provided to separate the high-voltage transmission apparatus from the low-voltage commercial and railway circuits. All of the local 2300-volt, sixty-cycle feeders, the 600-volt d.c. railway feeders, and the a.c. arc-lamp feeders which are carried in tile conduits from the steam station to the terminal house, are connected at this point to the outgoing steel-tower lines. The terminal house is 14 ft. square and is placed about 30 ft. from the substation building. It houses the lightning arresters for the feeders mentioned above. From the building the lines lead to a steel tower erected directly over it. From this point special steel towers support the line as it passes from the quarry, in which the plant is located, to connect with the city railway, lighting and power lines. These towers also serve to carry the local 13,200-volt line.

The addition to the generating system of the East St. Louis & Suburban Company described above was erected by the E. W. Clark & Company Management Corporation and will be operated by the East St. Louis Power Company. The construction work was superintended by K. B. Ward, assisted by G. W. McIver, electrical engineer, and H. H. Bailey, mechanical engineer.

Safety Movement in England

The Great Western Railway, England, has recently presented to each of its 80,000 employees a most interesting forty-eight-page pamphlet entitled "The Safety Movement." The introduction gives the railway accident statistics for the United Kingdom, showing what proportion was due to want of caution by the men themselves. The greater part of the book comprises many illustrations with appropriate text to show both safe and dangerous ways of working on locomotives, freight cars, passenger cars, in yards and shops, in baggage rooms, on track jobs, on hand cars, etc. Various safety devices such as goggles and respirators are also described. A detailed tabulation of one month's personal accidents in the various departments of the railway is given at the end with an earnest injunction to all to help in the "safety movement."

Minority Report on Crosser Bill

Abstract of Report Presented on Subject of Government Ownership of Railways in District of Columbia—Faults of Bill Outlined and Asserted Advantages Refuted

The complete minority report on the Crosser Bill, providing for government ownership of street railways in the District of Columbia, noted in the Electric Railway Journal of Aug. 8, is now available. The report was signed S. E. Winslow, Worcester, Mass.; E. E. Reed, Manchester, N. H.; Samuel Wallin, Amsterdam, Pa.; Abraham L. Keister, Scottdale, Pa.; S. F. Prouty, Des Moines, Ia.; T. H. Calway, Jonesboro, Md., and Ben Johnson, Bardstown, Ky. An abstract of the report is published below.

Only two real points were made in support of the contention that municipal ownership is needed in the District of Columbia: That the citizens would be given universal transfers; that the companies are now overcapitalized, and in consequence the traveling public is being cheated out of proper rights which it would obtain under public ownership.

Universal transfers are urgently needed in the District. We believe the quickest and surest way to obtain universal transfers is for the Public Utilities Commission to press energetically a demonstration that the two companies can afford to provide this service. Other efforts to obtain universal transfers may be more spectacular and sensational, but will not be so constructive in result. Condemnation of railways and purchase by the District with the accompanying great expense are not needed to bring this about.

With all the references to overcapitalization, there were not presented to the committee any facts whatsoever to sustain the charge. This Congress has appropriated $100,000 for a physical valuation of these properties. The question of overvaluation, if any, can be intelligently dealt with when the report is made and not until then.

Faulty Structure of Bill

Section 2 provides that condemnation proceedings shall be instituted, and succeeding sections provide that a final award shall be made under one or another course and that the District shall then take over the lines at the amount of the award—whether it should appear to be excessively burdensome or otherwise. There are no data on the probable amount of the award other than the claim of a Washington street railway official that it would exceed $55,000,000, the fact that the market value of the outstanding securities is about $48,000,000, the belief of the corporation counsel that the award ought to be under $30,000,000, and the statement of the proposer of the bill that in his opinion the physical valuation of the properties was about $25,000,000. As a matter of fact the Public Utilities Commission has under way a physical valuation of the properties and finds itself after seven months unable to give the committee any idea whatsoever what the valuation of the properties would be even when regarded only from the standpoint of physical valuation.

The wisdom of condemnation proceedings by the Public Utilities Commission, as provided by Section 4, might properly be questioned, for two of the members openly testified that they were strongly in favor of public ownership of such public utilities and had advocated it for many years, which might naturally preclude their having the open minds of arbitrators. Moreover, none of the three would claim to have expert knowledge of street railway matters. The wisdom of selecting this board is furthermore open to question because of the impossibility of any three men devoting to this problem the exacting study and thought necessary, when they are already burdened with so many other duties which may not be slighted.

Section 5 provides for a possible court review of the award by the Public Service Commission. Without questioning the conclusions of the court, however, an appeal to it would naturally add greatly to the uncertainty of the amount of the award in view of recent court rulings that owners are entitled to a greater amount than the mere physical value of the properties and that the assets of a going concern should be paid for. No testimony was submitted by the supporters of the bill to show any reason for expecting the amount of the award to be limited to what are commonly known as physical values. The majority report virtually assumes that the so-called physical values will alone determine the award. Such an assumption is clearly contrary to present practice; court decisions are quite the reverse. The proposed bill either by design or otherwise absolutely omits all reference to the basis of determining value, which omission clearly indicates general carelessness and complete lack of business acumen on the part of the framers.

Funds for the payment of interest and the redemption of the bonds covered by Section 6 must accrue solely from the net earnings of the street railways, without which the bonds would immediately come into default, apparently. The form and other usual provisions of bonds are not mentioned in the bill. If issued strictly in accordance with the terms of the bill there would be grave doubt as to the responsibility of the District for the payment of interest charges and for the redemption of the bonds at maturity in the event of insufficient receipts from the earnings of the railways to cover such charges. In view of such uncertainty of interest and sinking-fund payments it is difficult to conceive that a market at par or better could be found for any such bonds. On the contrary, it is more than likely that if the bonds were sold at all they would have to be disposed of at a price or prices far below par. This transaction in itself would impose on the railways at the inception a deficit of no mean proportions.

Section 6 further provides that the commissioners must acquire all the lines within the District, but are merely empowered to purchase the parts of lines lying outside the District boundaries. The possible complications which may follow this must be apparent to everyone. The testimony of witnesses failed to bring forth any specific or intelligent suggestion either as to the acquisition of these outside lines in the event of dispute over their values or as to their operation pending purchase negotiations, and all this with no indication of the possible cost.

By the provision of Section 8 the determination of the amount to be paid into the sinking fund each year appears to be optional with the commissioners. There would be no safety, however, in any plan of making payments into the sinking fund except that of paying a definite, uniform and fixed amount each year. The market value of the outstanding securities on April 14, 1914, was approximately $48,000,000. If the commissioners were to purchase the lines at this price and were to sell the proposed bonds at par there would be an annual interest charge at 3.65 per cent on $48,000,000

of bonds, or $1,752,000. If the sinking fund were advantageously invested at 3 per cent interest, compounded semi-annually, the annual deposit to the credit of the sinking fund would be $1,166,533. Thus the annual charges on an issue of $48,000,000 of bonds would be $2,918,533. In 1912, however, the railways paid out a total of $2,266,094.51 for interest and dividends, an amount $652,439 short of an annual fixed charge of $2,918,533. In 1913 the companies paid out for interest and dividends an amount $368,299 short of such an annual fixed charge. The taxes paid by the companies in 1912 amounted to $206,078.85 and in 1913 to $318,063.69. Under municipal ownership these taxes would not have to be paid, and this sum could be applied to meeting annual fixed charges, yet even this would be insufficient to make up the shortage.

Section 9 provides for the operation of the lines by the commissioners of the District under rules not in conflict with any existing law of Congress. The point has been raised that this provision may be interpreted to apply to the operation of street railways all existing acts of Congress relating to the District of Columbia. This would apply the eight-hour law for all employees, would give all employees thirty days' annual leave with pay and thirty days' sick leave annually, would prohibit the insurance of any property, would place in the hands of a departmental committee of the federal government the purchase of all supplies of more than $25 in amount, and would restrict the operation of the railways in various other legal and commercial ways.

In regard to the appropriation of $50,000 for the expenses incident to the condemnation and taking over of the lines, as provided in Section 10, it may be said that not an estimate was submitted to the committee by anyone as to the probable expense of the proceedings. The Public Utilities Commission, not being a board of experts, would have to call to its assistance innumerable experts, such as accountants, engineers, real estate appraisers, etc., to give very complete and detailed reports on the great number of points involved. Then, in the almost certain event of an appeal to the courts from its award, the commission would be compelled to defend its award at very heavy expense for counsel, experts, court expenses, etc. Numerous other items of expense are also apparent.

United States Commissioner of Labor statistics are given on the ratio of these preliminary expenses in the acquisition of various municipal lighting plants. The four largest plants show a percentage of 1.66 to the total cost of the plant, which in this case would mean preliminary expenses of $500,000 to $800,000. This indicates that the proposed amount of $50,000 is in itself an absurdity and only further emphasizes the hit-or-miss character of the whole bill. Furthermore, this money is to be appropriated out of the District funds with no provision for reimbursing the District out of the sale of the bonds or otherwise, thus at the very outset establishing the practice of dipping into the District funds raised by taxation.

ALLEGED ADVANTAGES OF THE BILL

Seven advantages which would accrue to the District by the municipal ownership and operation of the street railways have been set forth by the supporters of the bill, the first being "a great reduction in fares." The rate of fare now paid by most passengers in the District is 4 1/6 cents, or 6 tickets for 25 cents. This is lower than in most large cities of the United States. The average fare paid by all revenue passengers is very close to 4 cents. In 1913 the Capital Traction Company carried 53,425,152 revenue passengers for $2,295,956.41 at an average fare paid of 4.03 cents. Such figures as are available for the other company indicate practically the same average fare. The only basis for a reduction of fares is the hope that an award by the courts would make it possible to buy the railways at an amount considerably lower than the market value of the outstanding securities on April 14, 1914—$47,798,102.

The wage increase proposed by the supporters of the bill would in itself make any reduction of fares impossible. The report of the majority of the committee contrasts the rate paid in Washington to motormen and conductors, an average of 23½ cents an hour, to that paid in San Francisco on the one street municipal line, 37½ cents per hour. Such an increase in wages would cost the District railways more than $1,500,000 a year. If the District can buy the railways for the lowest price suggested—$25,000,000, which is about half the market value of the outstanding securities—such an increase of wages would absolutely prevent any reduction in fares. The present earnings of the road are just sufficient to meet operating expenses, pay taxes of $318,063.69, and leave $2,550,234.94 available for interest and dividends. If the municipal railways paid $1,620,169 for fixed charges and granted a wage increase of $1,500,000 the combined sum would be $3,120,169, giving a shortage of $569,934.06. By not paying taxes this would be reduced to $251,871.06. On the basis of 1913 a reduction of 1 cent in fares would mean a decreased revenue of $1,075,000, and a reduction of half a cent in fares a decreased revenue of $537,000. The extreme unlikelihood of any reduction of fares is obvious from the fact that if the railways are bought at the present market value of the securities a deficit is quite possible without either reduction in fares or increase in wages, while if they are bought at the figure of $25,000,000, practically at half price, the wage increase suggested would make a deficit in itself, and fare reductions would simply make the financial disaster more complete.

The evidence submitted regarding municipal railways elsewhere gives no assurance of reduced fares. The San Francisco Municipal Railways operates through a very productive territory and charges 5-cent fares, with the provision of half fares for school children during certain hours, a practice quite common in the United States. The municipal railway in Monroe, La., charges 5-cent fares. Several cities in the newly developed western section of Canada have municipally owned street railways, the largest being Edmonton. Heavy annual deficits there have recently forced a return to 5-cent fares. Illustrations of lower fares in Great Britain and other European countries are worthless, for different conditions of length of ride, number of available cars, wages, etc., offer no intelligent basis for comparison.

The second advantage claimed is "an improvement in service." Not the slightest bit of evidence was presented to the committee to the effect that service in the District of Columbia is not equal to the best in other large cities, whether the companies are operated under private ownership in the United States or under private or public ownership in foreign countries. The evidence showed that the Public Utilities Commission has already issued more than 600 orders or suggestions of changes to one company and only two have been resisted by the company, both of which may yet be enforced by the courts if found reasonable. If the service is unsatisfactory, the remedy for its improvement is at hand in the Public Utilities Commission law passed for this very purpose.

"More rapid extension of lines" is given as the third advantage. No unprejudiced testimony was presented to the committee to show that the existing companies were not extending lines as readily as other private

companies and much more readily than municipally owned foreign companies, or that they had refused any reasonable petitions on the part of the public for extensions. One witness protested against the refusal of the companies to extend lines in his section, but ultimately he admitted he was an executive officer of a real estate development company.

The fourth claimed advantage is "increase of traffic due to lower fares and improved service." It is purely a speculation that any more people would be riding if fares were slightly or even materially reduced—a theory not based on available facts, testimony or evidence.

"Improvement in conditions of labor" is given as the fifth advantage. The testimony indicated that labor conditions on the street railways in the District were on a parity with other labor conditions in the District. If the conditions are unjust, the Public Utilities Commission and Congress should exhaust all possible means for an improvement before resorting to the financial hazard of municipal ownership.

"Full publicity of cost and value," the sixth advantage, should be obtained by the Public Utilities Commission. If that commission has not sufficient power, an appeal to Congress for further authority would surely be granted. Authoritative evidence was presented in the hearings to the effect that municipally owned utilities are more likely to err in this matter than privately owned public utilities.

"Change of purpose from private profit to public service" is given as the seventh advantage, but it is no advantage. Every improvement in service would be an advantage, but with equally good service from privately owned and publicly owned utilities it is a distinct disadvantage to close up an avenue of opportunity for American individual enterprise. A comparison of efficiency of employees of privately owned utilities with those of government offices will not be to the credit of the public employees.

Public Opinion in the District

The report states that definite resolutions in favor of the Crosser bill were not submitted by any one of the score or more of citizens' organizations in the District. On the contrary, one presented resolutions against it and a number were reported as voting against going on record. Only fifteen witnesses appeared in behalf of the bill. The report contains a schedule showing the occupations of these witnesses, complaints against present operation, reasons for interest in bill, general arguments in favor of the bill, tax assessments, opinions concerning purchase regardless of cost and number of years in favor of municipal ownership. Of the fifteen witnesses, one complained against the present rate of fare, one against the number of cars running to the suburbs, two against crowds in rush hours and one against the refusal to build a suburban extension. The remainder of the witnesses either would not discuss this phase of the question or had no complaint to make. With one exception every witness expressed his firm belief in public ownership of public utilities as a general proposition, and a cross-examination as to the number of years they had been in favor of municipal ownership showed that the force behind the bill was almost all consistent and long-time advocates of municipal ownership.

The fifteen witnesses out of a total population of 350,000 represented a taxation assessment of $123,197 out of a total assessed valuation of $380,000,000 in the District. The above-mentioned tax assessment for the fifteen witnesses, however, was confined to four persons, the remaining eleven not being at all assessed. It is stated in general that efforts made by the committee to learn of any public demand for the Crosser bill were not successful other than in demonstrating that no public sentiment in favor of the bill existed.

Municipal Ownership in General

In concluding, the minority report states that the evidence submitted has not been conclusive on the question of the success of municipal ownership of electric railways. Data from a 9-mile street railway in Monroe, La., were very scanty. A municipal line in New Orleans must be excluded from consideration, for it is merely a belt line for the transfer of freight from one terminal to another. As for the municipal line of San Francisco, when the annual redemption of bonds must be met, the net profits from operation would be inadequate to pay the costs of operation and all the other charges if the railway did not save $40,000 or more in taxes and services from other city departments. With this saving of $40,000, although at a like expense of other departments of the city, the lines may even then fail by a few thousands of dollars annually to meet all charges, on the basis of the present receipts and expenses. There appears to be no great inspiration for Washington in this example of municipal railways. James Dalrymple, general manager Glasgow Corporation Tramways, at one time expressed his opinion that municipal ownership of street railways should be successful in the United States, but after a visit to the United States and personal inquiry into American conditions he said: "What I have seen here, and I have studied the situation carefully, makes me realize that private ownership under proper conditions is far better for the citizens of American cities."

Ten Commandments of Safety

At the Lorain Steel Company's plant at Johnstown, Pa., the following ten commandments have been adopted for the guidance of the employees:

1. Thou shalt have no other thoughts than thy work.
2. Thou shalt take no unnecessary risks, nor try to show off, nor play practical jokes, for by thy carelessness thou mayest do injuries which will have effect unto the third and fourth generations to follow.
3. Thou shalt not swear, nor lose thy temper when things do not come just right.
4. Remember that thou art not the only one on the job and that other lives are just as important as thine own.
5. Honor thy job and thyself that thy days may be long in employment.
6. Thou shalt not clean machinery while it is in motion.
7. Thou shalt not watch thy neighbor's work, but attend to thine own.
8. Thou shalt not let the sleeves of thy shirt hang loose, nor the flaps of thy coat be unbuttoned, as they may get caught in the machinery.
9. Thou shalt not throw matches or greasy waste on the floor, nor scatter oil around the bearings, as a dirty worker is a clumsy worker, and a clumsy worker is a menace to his fellow workers.
10. Thou shalt not interfere with the switches, nor the dynamos, nor the cables, nor the engines, nor anything else thou art told is dangerous.

The Mayor of Portland, Ore., recently requested a committee composed of prominent men of Portland to investigate the general condition of the city and report to him with suggestions and recommendations to make Portland a safer city. B. F. Boynton, claim agent Portland Railway, Light & Power Company, was elected chairman.

Rolling Stock for Montreal Tunnel and Terminal

The Present Article Describes the Locomotives and Motor Cars for This 2400-Volt D.C. Electrification — The Locomotives Are Similar to the Butte Design but Are Geared for a Speed of 45 M.p.h.— The Motor Cars Are of Steel for Suburban High-Speed Service

BY W. C. LANCASTER, ELECTRICAL AND MECHANICAL ENGINEER MACKENZIE, MANN & COMPANY, LTD., MONTREAL

In the March 14 issue of the ELECTRIC RAILWAY JOURNAL the writer described the causes leading up to the choice of 2400 volts direct current for the electrification of the Canadian Northern Railroad at Montreal.

The electric rolling stock for the operation of the tunnel and terminal will consist of both electric locomotives for hauling the trains ordinarily operated by steam, and multiple unit cars to maintain a quick and frequent service between the main passenger terminal in the city and the country just west of Mount Royal, which, it is expected, will be rapidly built up and form one of the most attractive suburbs of Montreal.

LOCOMOTIVES

The 2400-volt d.c. locomotives are substantially the same in appearance and dimensions as those of the Butte, Anaconda & Pacific Railway, which were illustrated in the ELECTRIC RAILWAY JOURNAL for June 7, 1913, page 1010. As the schedule for the locomotive trains does not call for high speed, it was not thought necessary to resort to any of the special methods of connecting the motors to the driving axles, such as are used on the side-rod and gearless types. The motors will be nose-supported in the usual way and geared to the axle by means of twin gears.

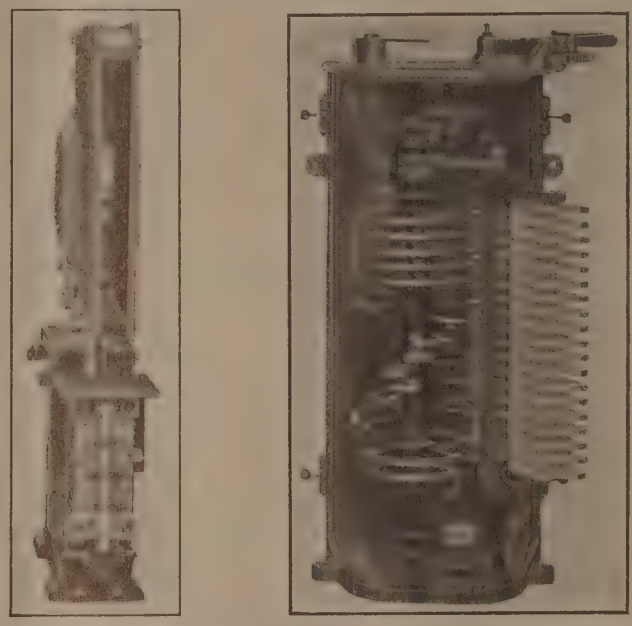
The locomotive has four axles with all the weight of the locomotive upon the eight driving wheels. The running gear consists of two four-wheel trucks, articulated together by a heavy hinge. The equalization of the trucks is accomplished by a semi-elliptic leaf spring over each journal box, connected through spring hangers to the frame and to the equalizer bars. The equivalent of a three-point suspension is thus obtained through the side equalization of one of the trucks and both side and cross equalization of the other truck.

The friction draft gear is mounted in the end frame casting of the truck. The cab, which is of the box type, is divided into three compartments, the center compartment for the apparatus and the two end compartments for the operator. Each operator's compartment is supplied with controller, control switches, ammeter, air brake and pantograph control, air gages, 2400-volt cab heater, bell rope and control for the whistle and sanders, thus providing the locomotive with complete double-end control.

The motor equipment consists of four GE-229A commutating pole motors wound for 1200 volts and insulated for 2400 volts, two of these motors being permanently connected in series for operating on the 2400-volt trolley circuit. The one-hour rating of each motor is 315 hp at 1200 volts. The motors are designed for forced ventilation, which is obtained by means of a blower in the locomotive cab. Either pair of motors may be cut out, in case of emergency, by a special handle on the change-over switch. The locomotives are geared for a free running speed on tangent level track of approximately 45 m.p.h. and are operated as two-speed machines with ten points in series and nine points in series-parallel. The master controller used is of the non-automatic type and has two handles, one regulating the applied voltage at the motors and the other for controlling the direction of rotation of the motors. The rheostats which form the external motor resistance are placed near the roof of the cab and provided with ample natural ventilation.

The master controller and contactor energizing circuits are designed for 125 volts. Each contactor is easily accessible without any disturbance to adjacent contactors. A special electro-pneumatic change-over switch is used for making the transition between series and series-parallel connection of the pairs of motors.

The 125-volt current for operating the contactors and for lighting the cab and headlights is obtained from a motor-generator set, the motor of which has two



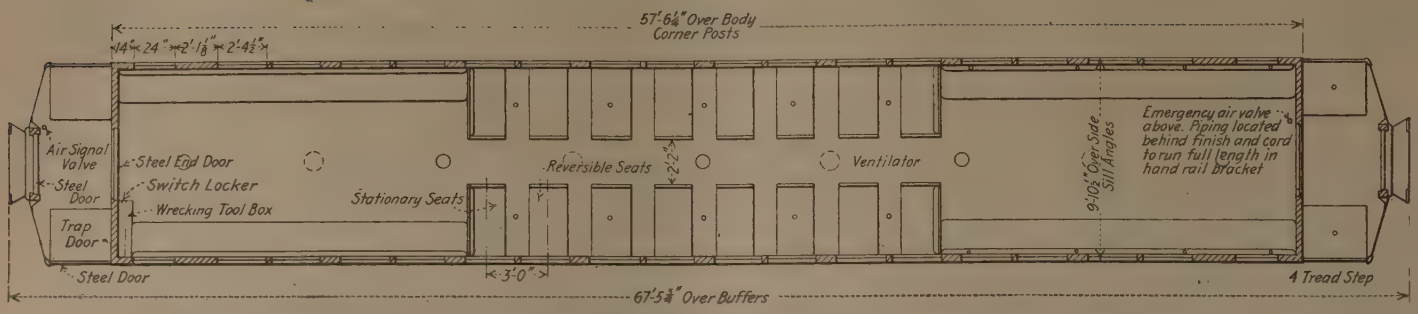
MONTREAL TERMINAL ELECTRIFICATION—CONTACTOR WITH INTERLOCK; MASTER CONTROLLER FOR LOCOMOTIVE

1200-volt windings and two 1200-volt commutators in series for operation on 2400 volts. This set is mounted in the center cab and also drives the blower for providing forced ventilation to the main motors.

Fuses of the copper ribbon type placed in fuse boxes provide protection for each individual circuit as well as the main circuit from the trolley. These fuse boxes are all arranged to blow into a common chamber designed to take care of the arc. In addition to the fuse on the main circuit, a main switch is also provided. This is of the knife-blade type, being opened and closed by a handle placed in a position for easy operation in case of emergency or when it might be necessary to open the circuit while carrying current. This main switch blows into the chamber provided for the fuses, and has a powerful magnetic blowout.

The trolleys are of the Butte roller pantograph type, pneumatically operated and mounted on insulated bases. Two pantographs are used per locomotive. A hand pump is provided in case a locomotive has been standing for some time and has no air supply.

A Warner speedometer, similar to the type largely used on automobiles but especially designed for locomotives, is located in each operating cab. These will



MONTREAL TERMINAL ELECTRIFICATION—PLAN OF MOTOR CAR WITH SWING TYPE DOORS

be connected to the driving wheels of the locomotive by means of flexible shafts and gearing.

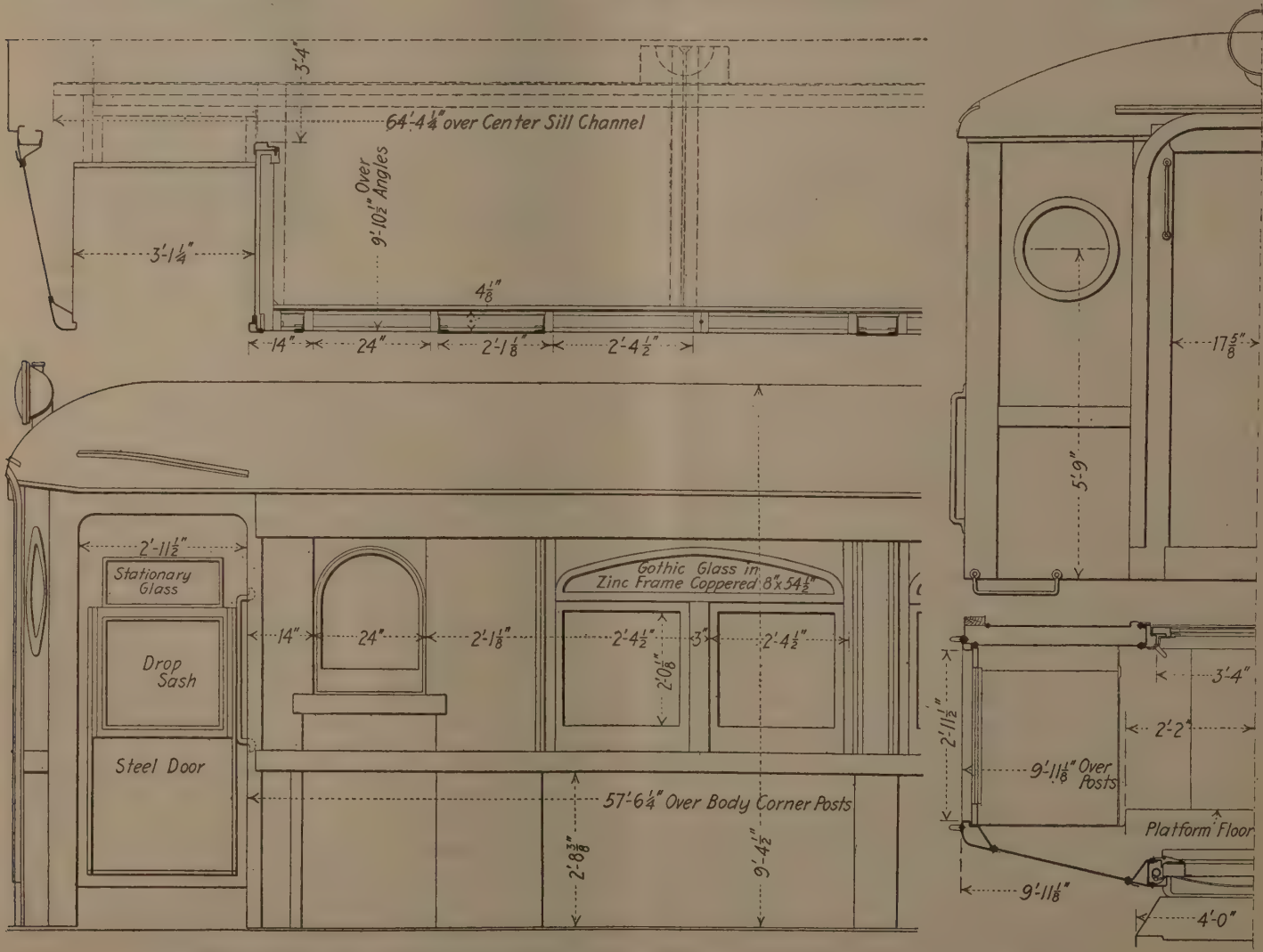
A combined straight and automatic air-brake equipment is provided on each locomotive. This equipment includes a 2400-volt motor-driven air compressor, the set consisting of two 1200-volt motors operating in series on 2400 volts and direct-connected to an air compressor having a displacement of 100 cu. ft. of free air per minute. The approximate total weight of each locomotive is 83 tons. Some of its principal dimensions and characteristics are given in the following table:

Length inside knuckles	37 ft. 4 in.
Length over cab	31 ft. 0 in.
Overall height, pantograph down	15 ft. 6 in.
Height over cab	12 ft. 10 in.
Over-all width	10 ft. 0 in.
Total wheelbase	26 ft. 0 in.
Rigid wheelbase	8 ft. 8 in.
Total weight, all on drivers	83 tons
Wheel diameter	46 in.
Tractive effort at 30 per cent tractive coefficient	49,800 lb.
Tractive effort at one-hour rating	20,300 lb.
Tractive effort at continuous rating	14,500 lb.

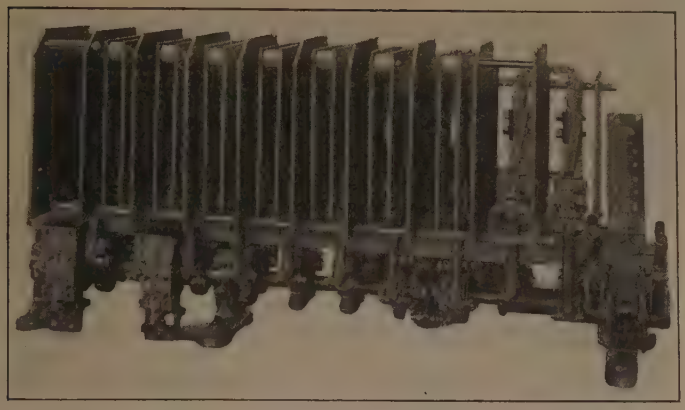
A floor plan of the cars, showing the arrangement of seats, doors and windows, is published. No sliding doors are used, as such doors tend to weaken the car just where most strength is required in case of collision. All the doors swing, so that the corners of the cars may be made as strong as is necessary.

Cross seats are used near the center of the car and longitudinal seats near the ends. This arrangement gives plenty of room near the doors where most of the crowding occurs when passengers are leaving or entering. It also tempts the passenger by means of the more comfortable cross seats to "move up to the center of the car." As shown in the side and end views of the car, presented herewith, the underframing is entirely of steel. The car body is also of steel except for window frames, wainscoting, side posts and part of the floor, which are of wood, and the headlining, which is of a heat-resisting, pressed-fiber board.

The underframing is of the center box girder construction, employing two 9-in. 15-lb. channels spaced



MONTREAL TERMINAL ELECTRIFICATION—ELEVATIONS AND PART PLANS OF MOTOR CAR

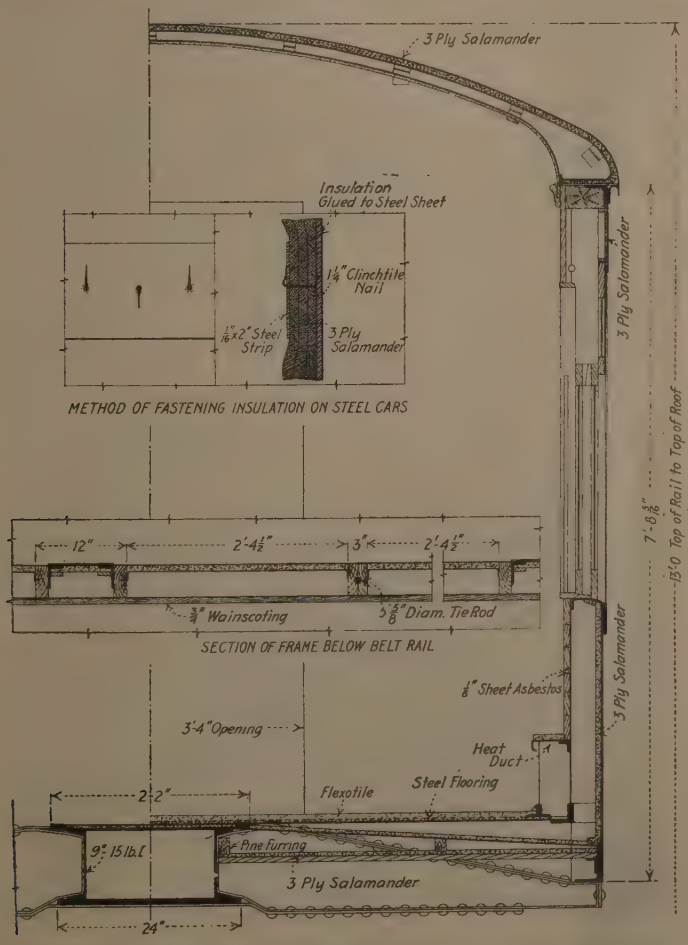


MONTREAL TERMINAL ELECTRIFICATION—ELECTRO-PNEUMATIC CHANGE-OVER SWITCH

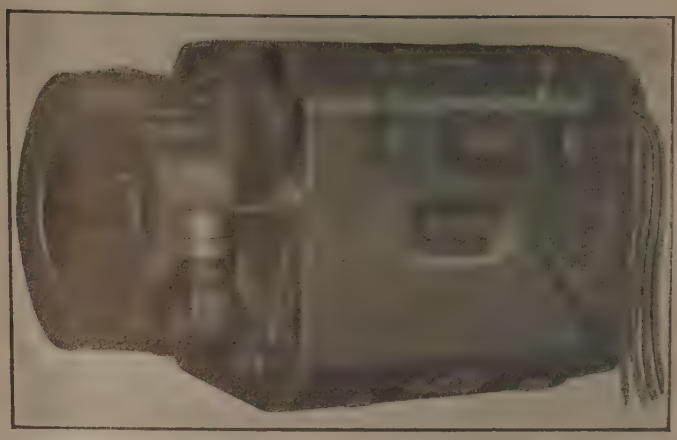
16¾ in. back to back and fitted with a top cover plate 26 in. x ¼ in. and a main bottom cover plate 24 in. x ⅜ in. The body and end sills are of structural steel shapes. Trap doors of Edwards all-steel construction are installed. The bolsters are built up of plates and angles. The Standard Coupler Company's buffers and Miner draft gear are used.

The flooring consists of a bottom layer of tongue and grooved spruce, on top of which is spread a layer of three-ply "Salamander." Between this and the main floor is an intermediate insulating floor formed of ⅛ in. steel plate, on top of which is also laid a layer of three-ply "Salamander." The main steel floor, on top of which is spread a layer of "Flexotile" composition flooring, consists of "Chanarch" steel.

As regards the side framing, the main side posts are formed of 3 in. x 2 in. x 5/16 in. rolled steel angles acting as a stiffener for the side sheeting and a suitable connection for the wooden side posts. At the belt rail the sheeting is further stiffened by a 4-in. x ½ in. bar extending the full length of the body. The corner posts are built up of 3-in. x 2-in. angles with 3/16-in. pressed steel cover plate extending around and over the side and end sheets. The side sheets are of 0.110-in. thick cold rolled steel plate.



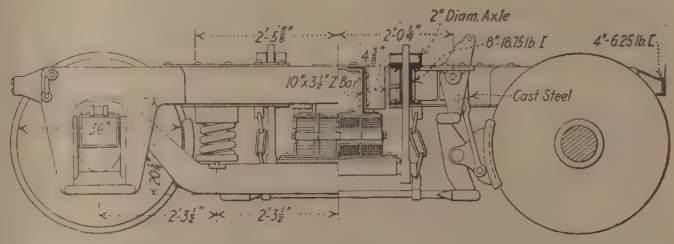
MONTREAL TERMINAL ELECTRIFICATION—CROSS-SECTIONS SHOWING FLOORING, HEAT INSULATION, ETC.



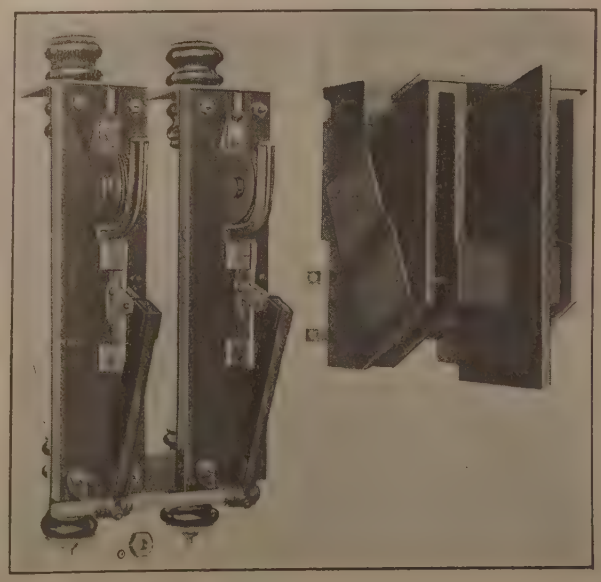
MONTREAL TERMINAL ELECTRIFICATION—VENTILATION SCREEN IN MOTOR

Particular attention has been given to the heat insulation. For the sides, roof and ends of the car this insulation consists of three-ply "Salamander." It is secured to the steel by means of glue and the Cleveland Tack Company's "Clinchtite" nails spot-welded to the sheet steel and provided with steel retaining bands. This method is similar to that used by the New York, Westchester & Boston Railway.

The trucks are of this railroad's plate frame construction built for a center plate capacity of 40,000 lb., and they are of the side equalized type. Case-hardening is applied for all hangers and rod jaws, for all pin ends of levers and where all holes occur in the same. The



MONTREAL TERMINAL ELECTRIFICATION — TRUCK FOR MOTOR CARS



MONTREAL TERMINAL ELECTRIFICATION—MAIN SWITCH

wheels are of rolled steel and are 36 in. in diameter. The journals are 5½ in. x 10 in. and of the American Electric Railway Association standard with McCord boxes.

The outside and inside finish and all fittings and other details are made to conform as nearly as possible with Canadian Northern standard practice.

The principal dimensions are given in the following table:

Length over buffers	67 ft.	5¾ in.
Length over body corner posts	57 ft.	6¼ in.
Truck centers	42 ft.	9 in.
Width over side sill angles	9 ft.	10½ in.
Width over eaves	10 ft.	2¾ in.
Height top of rail over roof	13 ft.	0 in.
Height top of rail to underside of side sill	3 ft.	7½ in.
Center to center of body side bearings	4 ft.	10 in.
Center to center deck sills	5 ft.	6 in.

The approximate weight of the car loaded and equipped is 160,000 lb.

The electric hot air system of car heating is used. One complete heater is placed underneath each car and receives its energy direct from the 2400-volt supply. The heater has a capacity of approximately 25 kw and is constructed for two heat combinations so as to provide for the changes in temperature conveniently and economically.

The complete heating equipment consists of the heating unit, blower and regulating mechanism, the controlling switch and thermostat of the regulating mechanism being arranged for operation from the 600-volt supply. Air is forced over the heating unit by means of the blower and distributed to the car through the air ducts along the sides of the car. The blower used for the circulation of the air is operated by a motor which is connected in series with the heating unit on the ground side. The capacity of the blower is approximately 1000 cu. ft. of air per minute.

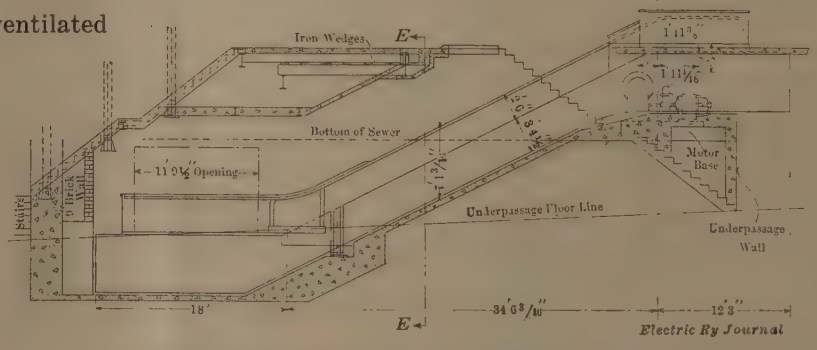
The motor equipment consists of four fully ventilated GE-239A, 125-hp, 1200-volt commutating pole motors insulated for 2400 volts. Two of these motors are permanently connected in series for 2400-volt operation. Ventilation of the motor is accomplished by drawing air into the armature at the pinion end by means of the fan on the armature shaft. The air passes longitudinally through the whole interior of the motor and is expelled through an opening in the frame at the commutator end. This opening is protected by wire mesh. A back view of the brush-holder and support is also shown.

The control is of the non-automatic type for multiple-unit operation. The equipment includes a motor-generator set for furnishing 600-volt current for the control circuits, the air compressor and lighting circuits. This set consists of two 1200-volt motors, operating in series on 2400 volts, direct connected to a 600-volt generator. The master controller, contactors, switches, reverser and pantograph are of essentially the same construction and appearance as those already described for the locomotives. The controller will have five steps in series and four steps in parallel. It differs from the locomotive controller in having the usual motorman's operating handle instead of a lever. This handle is provided with means for cutting off power and applying air brakes in case the motorman removes his hand.

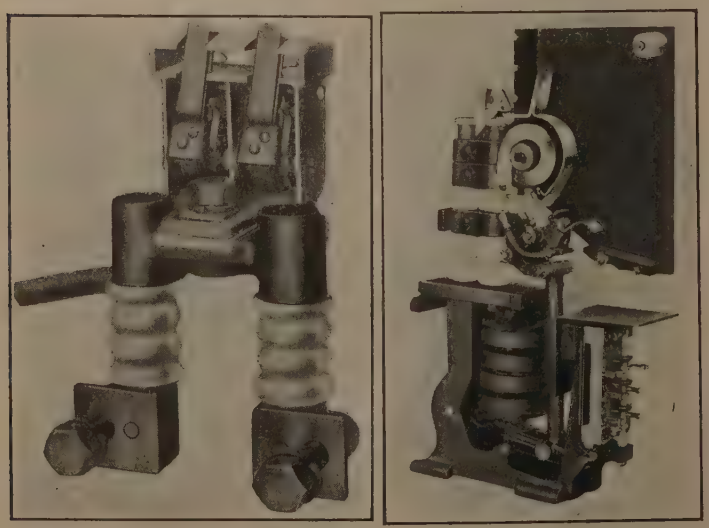
Copper ribbon fuses similar to those on the locomotive will be used and an aluminum cell lightning arrester is installed on each car.

Improvements at the Juniper Street Station in the Philadelphia Subway

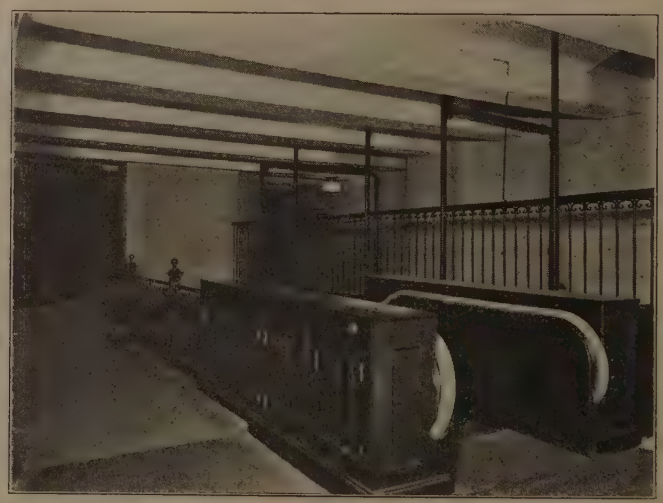
In the Market Street subway in Philadelphia there is a point near the business center where the east-bound surface cars in the subway make a loop under the elevated line cars, which are also in the subway, and return west. Passengers coming in from West Philadelphia transfer at this point if they desire to go farther east, say to the Delaware River ferries. Obviously a considerable part of the traffic terminates at this station, Juniper Street. This underground station has been laid out with a view to making its operation so convenient for passengers that there could be no possible cause for complaint on account of the necessity for using two levels. For this reason a down escalator has been installed between the two levels, in addition



PHILADELPHIA SUBWAY—CROSS-SECTION ESCALATOR WAY, JUNIPER STREET STATION



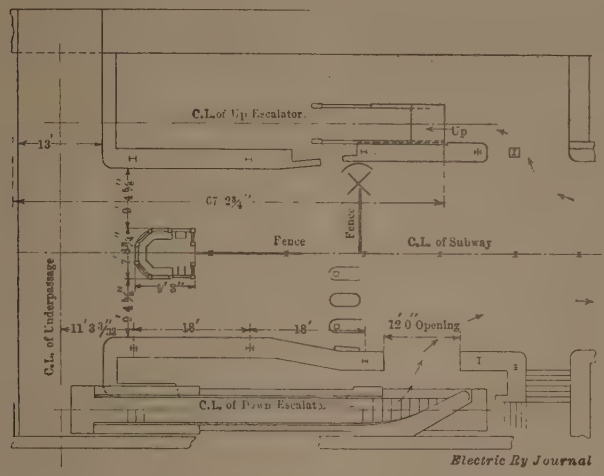
MONTREAL TERMINAL ELECTRIFICATION—REAR OF BRUSH-HOLDER; SIDE VIEW OF CONTACTOR WITH INTERLOCK



PHILADELPHIA SUBWAY—VIEW OF ENTRANCE TO DOWN ESCALATOR

to the up escalator and conveniently placed staircases. The down escalator is very popular in spite of its comparative novelty, very few passengers using the stairway, which they could do with little extra effort.

The accompanying illustrations show some details of the station. One diagram is a plan of the lower level. Passengers entering the lower level direct from the street come in at the left in the figure, secure tickets at the booth shown and pass through the entrance to the



PHILADELPHIA SUBWAY—PLAN OF LOWER LEVEL, JUNIPER STREET STATION

large passage at the right which leads to the surface car loading platforms. Outgoing passengers from the lower level can pass out through the turnstile or to the upper level on the up escalator. Passengers from the upper level can reach the lower level either by way of the down escalator or by the stairs directly over it. A section showing the down escalator and staircase is given in a second diagram.

The halftones show details of the down escalator, those from photographs taken at the foot having been chosen to illustrate particularly the method of lighting

PHILADELPHIA SUBWAY—FOOT OF ESCALATOR, LOOKING UP

PHILADELPHIA SUBWAY—FOOT OF ESCALATOR, LOOKING DOWN, SHOWING ILLUMINATED SIGN

used. Unusually good light is desirable at this point to avoid confusion due to the novelty of the construction. The escalator way is brilliantly illuminated by lamps mounted in reflectors near the ceiling beams and through openings in the bottom of the illuminated box sign. An usher is located at the bottom of the escalator to assist passengers who may still not understand the method of getting off.

The Juniper Street station involved special structural problems due to the difficulty of underpinning the adjacent buildings. Cross beams much heavier than were needed for floor support were used for this purpose. Space limitations also prescribed a most economical arrangement of staircases, escalators and passageways. The result has been a layout which permits the handling of large crowds with little congestion.

The city of San Francisco is using the cement gun to finish the ornamental concrete poles which are being erected on Van Ness Avenue in San Francisco. The poles are for the double purpose of lighting and carrying trolley wires for the new municipal railway, and the coating is being applied after the poles are erected so that the finish will be free from the marks of handling, and the pole proper will seem to be monolithic with the base. After the surface has been sufficiently coated it is immediately trowelled to the desired lines, the aim being to secure a cement coating about 3/16 in. thick. The contract price for the finishing is $26 per pole.

Proceedings of Pacific Claim Agents' Association Convention

At the opening session of the Pacific Claim Agents' Association convention in Spokane, Wash., on July 8-11, addresses were delivered by W. J. Hindley, Mayor of Spokane, and D. L. Huntington, president Washington Water Power Company, Spokane, Wash. Most of the addresses, papers and discussions making up the program were related to two general questions; namely, protection against fraudulent (personal injury) accident claims, and the "safety first" movement. After the annual address by J. H. Handlon, president of the association, papers were read by A. M. Lee, Harrison Allen, S. A. Bishop, J. H. Handlon, H. G. Winsor, Thomas G. Aston, B. F. Boynton, A. E. Beck, H. K. Relf, George Carson, T. M. Lyall, Ida P. Newell and T. J. Rupli. The papers by Messrs. Bishop, Handlon, Boynton, Allen and Carson were abstracted in the ELECTRIC RAILWAY JOURNAL of July 18 and that by Mr. Relf in the ELECTRIC RAILWAY JOURNAL of July 25. An abstract of the paper read by Mr. Winsor is published below.

The last day's session was opened with an address by Charles T. Banks, superintendent of efficiency of the Northern Pacific Railway, St. Paul, Minn., who outlined the safety measures and safety organization of his company. The final paper was the report of the association's standing committee on safety, composed of Messrs. Carson, Aston, Lee, Boynton, Beck and Winsor. This report was abstracted in the ELECTRIC RAILWAY JOURNAL of July 25. The convention had as invited guests Chairman Floyd L. Daggett and Clarence Parker, of the State Industrial Insurance Commission, both of whom addressed the convention and participated in the discussions.

Officers of the association for the ensuing year were elected as follows: President, A. M. Lee, Seattle, Wash.; first vice-president, Thomas G. Aston, Spokane, Wash.; second vice-president, H. K. Relf, Portland, Ore.; third vice-president, S. A. Bishop, Los Angeles, Cal., and secretary-treasurer, T. N. Henry, Seattle, Wash. The executive committee members were chosen as follows: H. G. Winsor, Tacoma, Wash.; Thomas A. Cole, Los Angeles, Cal.; A. E. Beck, Vancouver, B. C.; A. Molesworth, Portland, Ore.; L. Frank Gordon, Portland, Ore., and T. J. Rupli, Seattle, Wash.

PACIFIC CLAIM AGENTS' INDEX BUREAU

The annual meeting of the board of directors and the officers of the Pacific Claim Agents' Index Bureau was held in Spokane, Wash., July 11, the last day of the Pacific Claim Agents' Association convention. Since the beginning of 1912 this bureau has accumulated in its card index files more than 25,000 names of personal injury claimants and exposed more than 200 "repeaters." Officers were elected for this year as follows: President, George Carson, Seattle, Wash.; first vice-president, B. F. Boynton, Portland, Ore.; second vice-president, J. S. Mills, Oakland, Cal.; treasurer, H. G. Winsor, Tacoma, Wash., and secretary, T. N. Henry, Seattle, Wash. The board of directors is composed of Thomas G. Aston, Spokane, Wash.; L. Frank Gordon, Portland, Ore.; A. E. Beck, Vancouver, B. C.; Thomas A. Cole, Los Angeles, Cal.; H. K. Relf, Portland, Ore., and H. J. Handlon, San Francisco, Cal.

ACCIDENT COST OF TRAINMEN AND LENGTH OF SERVICE

Following is an abstract of the paper "Accident Cost of Trainmen and Length of Service," by H. G. Winsor, claim agent Tacoma Railway & Power Company, Tacoma, Wash.

In making an investigation of step and gate accidents during the latter part of 1913 it developed that a large percentage of such accidents could be traced to trainmen who had been in the service for a certain period. In presenting the data now it must be noted that no information has been sought outside of the properties represented by the writer, and it may be possible that the results shown may be materially changed regarding a company located in a different region and operating under different circumstances.

The properties which the writer represents consist of: first, the Puget Sound Electric Railway, an interurban line operating between Tacoma and Seattle, and between Tacoma and Puyallup, Wash., having a total trackage of 97.84 miles and operating seventy-six trains daily; second, the Tacoma Railway & Power Company, operating eighty-three regular cars over 64.86 miles of track and termed the "city lines"; and, third, the Pacific Traction Company, an urban line from Tacoma to the Lake District, operating six cars over 22.13 miles of track. As the physical conditions under which each of these companies operates are materially different, it has been thought advisable to present the figures of each company separately.

The Puget Sound Electric Railway employs sixty-six regular men in the passenger service. During the year 1913 the total car miles amounted to 1,390,095; the total number of passengers carried, 2,693,085, and the accident cost charged to trainmen, $0.0248 per car mile and $0.0128 per passenger carried. The percentages of medical, legal, miscellaneous and settlement costs for 1913, charged to trainmen according to their years in service, are shown in Table I.

TABLE I—SHOWING PERCENTAGES OF 1913 ACCIDENT COSTS FOR PUGET SOUND ELECTRIC RAILWAY TRAINMEN ACCORDING TO YEARS IN SERVICE.

Length of Service	Percentage Men in Service	Per Cent	Settlements	Medical	Legal	General
Less than six months...	10.6	8.5	$2,607	$284	$53	$17
Six months to one year.	30.3	28.6	8,689	947	89	56
One year to two years..	18.2	20.0	6,083	663	18	39
Two years to three years	9.1	14.3	4,345	474	160	28
Three years to five years	9.1	2.9	869	95	178	6
Five years and more....	22.7	25.7	7,820	853	125	50
	100.0	100.0	$30,413	$3,316	$623	$196

The Tacoma Railway & Power Company employs 294 platform men in regular service. These men operate cars over the city lines, which include a cable line of 1.58 miles. All cars are equipped with gates. During the year 1913 the total car miles amounted to 3,643,858; the passengers carried, 25,737,670, and the accident cost charged to trainmen, $0.0150 per car mile and $0.0021 per passenger carried. The percentages of medical, legal, miscellaneous and settlement costs for the trainmen of the Tacoma Railway & Power Company according to their years of service are presented in Table II.

TABLE II—SHOWING PERCENTAGES OF 1913 ACCIDENT COSTS FOR TACOMA RAILWAY & POWER COMPANY TRAINMEN ACCORDING TO YEARS IN SERVICE.

Length of Service	Percentage Men in Service	Per Cent	Settlements	Medical	Legal	General
Less than six months...	32.6	21.38	$10,634	$497	$461	$60
Six months to one year.	11.9	17.92	8,910	416	386	50
One to two years.....	10.6	17.92	8,910	416	386	50
Two to three years.....	14.4	11.56	5,748	269	249	33
Three to five years.....	11.3	17.92	8,910	416	386	50
Five years and more...	19.2	13.30	6,611	309	286	38
	100.0	100.00	$49,723	$2,323	$2,154	$281

The Pacific Traction Company employs eighteen men in the regular service, operating five cars. Approximately 75 per cent of the 22 miles of track is laid on private right-of-way. The cars are equipped with doors and the greater part of the line is protected by block signals. The total mileage for the year 1913 was 505,881; the total number of passengers carried, 1,886,884, and the cost of accidents charged to train-

men, $0.0032 per car mile and $0.00086 per passenger carried. Table III gives the percentages of medical, legal, miscellaneous and settlement costs for the trainmen of the Pacific Traction Company according to their years of service.

TABLE III—SHOWING PERCENTAGES OF 1913 ACCIDENT COSTS FOR PACIFIC TRACTION COMPANY EMPLOYEES ACCORDING TO YEARS IN SERVICE.

Length of Service	Percentage Men in Service	Per Cent	Settlements	Medical	Legal	General
Less than six months...	5.6	7.1	$90	$3	$14	$8
Six months to one year.	5.6	7.1	90	3	14	8
One to two years.....	22.2	28.7	360	13	59	30
Two to three years.....	11.1	...	...	...	...	...
Three to five years.....	11.1	...	...	...	...	...
Five years and over....	44.4	57.1	718	26	117	60
	100.0	100.0	$1,258	$45	$204	$106

In the investigation necessary to compile these figures, a careful observance of the cause of each accident was made. The personality and experience of trainmen who were responsible were also carefully considered, as well as the difference in physical conditions of the several lines. Another matter of considerable importance was the attitude of the public in different sections of the territory served.

Conditions which are present in Tacoma may be entirely different in some other locality. For this reason the writer has not thought it wise to report his conclusions as to what period of the average trainmen's service is the most efficient with respect to the elimination of accident cost. It may be said, however, that with the average trainmen there is a certain period of inexperience which adds greatly to a company's troubles. Yet after he has been in the service for a certain period, he is quite likely to assume responsibilities which belong to someone else and thus unnecessarily take chances which may ultimately result in serious accidents.

Safety Committee Meeting in Memphis

The first meeting of the July to December safety committee of the Memphis Street Railway Company was held July 11, the meeting being notable for the interest shown by the new members. Figures were read showing marked progress in the "safety first" work, and a paper entitled "Courtesy," was presented by A. D. McWhorter, master mechanic. This follows in abstract form:

The men who represent this company in its transportation department are selected with a view of establishing two important rules—caution and courtesy. Coming in direct personal contact with the public, the company's only customers, motormen and conductors are in a position to work for the permanent good or the incalculable harm of the company, and the reward for good or bad service is certain. The street car traveling public is composed of many peculiar individuals, and nobody knows better than the platform men how difficult it is to deal with that same public and keep its individual members in a contented frame of mind. It can be done, however, and, as a man can learn to handle the traveling public so can he learn to handle bigger men and bigger things. Sincerity, courtesy and, above all, common sense are the qualities necessary.

Getting along with the public is a great gift. The man with a small mind has a tendency to pick flaws, to argue, to find fault. Instead of dropping a misunderstanding he insists on "having it out." The man with the large mind rides over these little annoyances—the petty things over which the small man trips and stumbles. A conductor is not merely a collector of fares; he is the personal representative of the company. The student of human nature knows that tact is a great producer of success and that genius without tact is about as valuable as an expired transfer. It is not necessary to use a club of sarcasm or a battering ram of argument to gain a point with a passenger who may be full of friction, or at cross purposes with the world. It pays always to be patient with men and mules.

The person who is polite often finds himself imposed upon. He opens a door to let an old lady pass. He soon finds not only the old lady but everybody else takes advantage of the open door, never pausing to utter a word of thanks but absolutely blocking the door for the polite person himself. But he who conquers himself conquers the world. Courtesy is almost an absolute necessity for success in business and the men possesed of good manners, other things being equal, have reached fame or higher positions, when men more industrious as well as more scholarly, but wanting attractive manners, have remained in obscurity. Like virtue, politeness is its own reward. A pleasant manner helps to make the wheels of life run more smoothly and a little tact and a bit of kindness clear up many a difficulty, leveling many a rough way and shedding over the gray horizon of every-day life a ray of sunshine and joy.

The next speaker was E. W. Ford, general superintendent, who made a "chalk talk" on miles run per accident during the month of June, showing comparison with the same month of last year. The figures read by Mr. Ford showed the work in a healthy condition, showing a 30 per cent decrease in accidents over last year with a corresponding increase in number of miles run per accident.

Attorney Roane Warring spoke on the responsibility on the members of the safety committee, stating that the committee was now organized, the interest in the movement was increasing and each outgoing committee was showing a larger reduction in accidents than the previous committee. While the members should realize that they could help the other employees prevent accidents by reporting violations of rules, carelessness, unsafe operation, defective equipment, etc., they should be cautioned against looking on the safety movement as being for the purpose of spying on fellow workmen. It was for the mutual good of the employee and employer to help each other and prevent accidents. In conclusion Mr. Warring called particular attention to the humane side of the safety movement, saying that preventing accidents meant preventing untold sorrow, suffering, untold pain and loss of life which grow out of accidents. Attorney L. P. Miles also spoke.

District of Columbia Public Utilities Commission Report

The Public Utilities Commission of the District of Columbia has issued a report of its official proceedings for the ten months ended Dec. 31, 1913. The report contains information relative to electric railway accidents, inspections, equipment, extensions, pavement construction costs, service and track conditions. In addition to the foregoing there are presented tables showing the assets and liabilities of the companies within the district, the cost of road equipment and general expenditures, outstanding securities, operating revenues and expenses, analysis of passengers carried and miles of road and number of cars operated. In connection with each electric railway the commission also gives the results of its investigation concerning the outstanding stocks, bonds and debentures as of March 4, 1913. The information on these subjects, which was secured by means of answers to very detailed questions, is practically complete in regard to the companies' capitalization and ownership.

Illinois Traction System Special Service

Experience of Past Few Years Has Been Utilized in Devising Improvements in Details Making Electric Sleeper Service Very Attractive—Energy Consumption per Ton-Mile with Trail Cars Is Reasonable

The Illinois Traction System has operated sleeping cars for more than six years and observation parlor cars for nearly three years.

The original electric railway sleeping cars were built by the Holland Sleeping Car Company. These cars were inferior in their accommodation compared with later types of sleeping cars, but their use proved to the management that sleeping car service was a commercial possibility for an electric railway. After the Holland cars had been operated less than two years, four large sleeping cars incorporating many novelties in car-building, all designed to make sleeping-car service more comfortable and more safe were built especially for service between St. Louis, Springfield and Peoria.

H. E. Chubbuck, vice-president executive, and J. M. Bosenbury, superintendent of motive power, and equipment, Illinois Traction System, were the joint inventors of many of the novel features such as folding berths, safety deposit boxes for valuables, windows in upper berths, etc. The St. Louis Car Company has just completed another sleeper built according to the Illinois Traction standards. The new car is illustrated herewith. It is the fifth one of the new type to be built, and all five are now in active service. This type of car was described and illustrated on page 522 of the Electric Railway Journal for Sept. 30, 1911.

ILLINOIS TRACTION SYSTEM—NEW SLEEPING CAR

The sleeping cars, and in fact all of the freight and passenger cars of the Illinois Traction System, conform to the safety appliances and M.C.B. interchange requirements.

The sleeping cars are 57 ft. long over bumpers and 9 ft. 7 in. wide, and weigh 84,000 lb. The bodies are of heavy substantial Pullman-type construction with segmental arch roofs. They are mounted on steam-coach type four-wheel steel-frame trucks with quadruple elliptic bolster springs, and are provided with the M.C.B. contour, high-knuckle Sharon couplers, manufactured by the National Malleable Castings Company. These couplers are standard for all of the interurban equipment of the Illinois Traction System. There are twenty berths in each car, and the design of upper and lower berth is uniform. The cars are illuminated by seventy Mazda lamps, fed from a special panel governing a Gould storage battery of sixteen cells.

Sleeping-Car Service

Sleeping-car service is given between Peoria, Springfield and St. Louis. The distance from St. Louis north to Springfield is 100 miles, and from there to Peoria 75 miles.

The Illinois Traction System is the only road offering St. Louis, Springfield, Peoria sleeper service. The northbound train leaves St. Louis daily at 11:45 p. m., arrives at Springfield at 4:10 a. m. and Peoria at 7 a. m. The southbound train leaving Peoria 11:30 p. m., arrives at Springfield at 2:25 a. m. and St. Louis at 7:05 a. m. These trains are made up of a combination express, passenger motor car, a trailer coach and the sleeping cars. South of Springfield, the trains in both directions have two sleeping cars, namely, the through car between Peoria and St. Louis and the set-off Springfield car. The sleeping cars are ready for occupancy at 10 p. m., and passengers are allowed to remain in them until 8 a. m.

The combination motor-express cars which haul the sleeping-car trains were described in the Electric Railway Journal for Feb. 2, 1911, page 275. These cars are 52 ft. 6 in. long, 9 ft. 5⅜ in. wide, have underframing and body of heavy design and have four 140-hp motors. These motor cars satisfactorily haul the trailer coach and two or three sleeping cars at the average schedule speed of about 23 m.p.h., which includes time for cutting in and out extra cars at Springfield and making all station stops between 6 and 7 a. m. as the terminals are approached. The motor cars weigh about 100,000 lb. each. All sleeping car trains are equipped with Westinghouse A. M. V. air brakes with universal valves in place of triple valves.

Originally the sleeping-car trains were made up of a combination motor-passenger and baggage coach and two sleeping cars. The combination motor coach has seats for but twenty-four passengers, but these trains have developed coach traffic to such an extent that trailer coaches are now required. The baggage compartment of an ordinary motor passenger coach is not large enough to handle all of the baggage and express required for the sleeping-car trains. Considerable excess seating capacity also is desirable because of unexpected parties which use the trains for rides of 40 or 50 miles out of the terminals.

The sleeping car trains handle considerable theater traffic and serve as an "owl" train for the middle section of the road and as an early morning train for the other section near the arriving terminals.

A train crew for a four-car train is made up of a motorman, conductor, brakeman and two sleeping-car

porters. The porters are paid $45 a month and perform duties similar to those of Pullman-car porters.

The sleeping-car trains have brought to this railway system traffic which it otherwise would not have had. Practically all of the passengers who now take the sleeping-car trains, both in the coaches and in the sleepers, would otherwise have taken steam trains had the Illinois Traction System not introduced the sleeping-car service. The business has gradually increased until now five sleeping cars are required, four of which are in operation daily and a fifth in reserve for overhauling and for special parties, to which latter use it is frequently put. One reason for the success of this service is that passengers can go to bed in the sleeper at one terminal and be at the other at 7 o'clock in the morning for an expenditure less than the cost of a hotel room in Springfield. The berth fare between Peoria and St. Louis is $1.50 for a lower and $1.25 for an upper.

The sleeping-car trains have net earnings of about $40,000 a year, and it is interesting to note that the earnings are practically the same for summer and winter. The gross earnings of a typical month were $5,679, the expenses $2,425 and the net profit $3,254. In these expenses are included the wages of motorman, conductor and porters, superintendence, power, maintenance of equipment, trackage, laundry, advertising, car cleaning, etc. The cost for laundry is about $15 per month per car, not including wear and tear.

PARLOR-OBSERVATION CARS

In 1911 the Illinois Traction System inaugurated an extensive parlor observation car service which has since been expanded, until now seven fine, large, heavy parlor cars are in use. The latest addition to this equipment is illustrated herewith. This car conforms to the earlier standard and was built by the St. Louis Car Company. The designs for this car, as well as those for the sleeping cars, were made and the construction supervised by Mr. Bosenbury. The parlor car weighs 80,000 lb.

Parlor cars are attached to limited trains, but not all limited trains have parlor cars. Those with the parlor cars attached make two round trips a day between Peoria and St. Louis, 175 miles each way, one round trip between Springfield and St. Louis, 100 miles each way, and two round trips between Springfield and Danville, 127 miles each way. The Danville-Springfield service connects with the Peoria-Springfield service, so that through service is given to and from St. Louis. The running time of a limited passenger motor car with trailer attached from St. Louis to Danville, 227 miles, is nine hours and fifteen minutes, and the running time between St. Louis and Peoria is six hours and forty-five minutes. Thus the schedule speeds of these trains

ILLINOIS TRACTION SYSTEM—INTERIOR OF PARLOR-OBSERVATION CAR

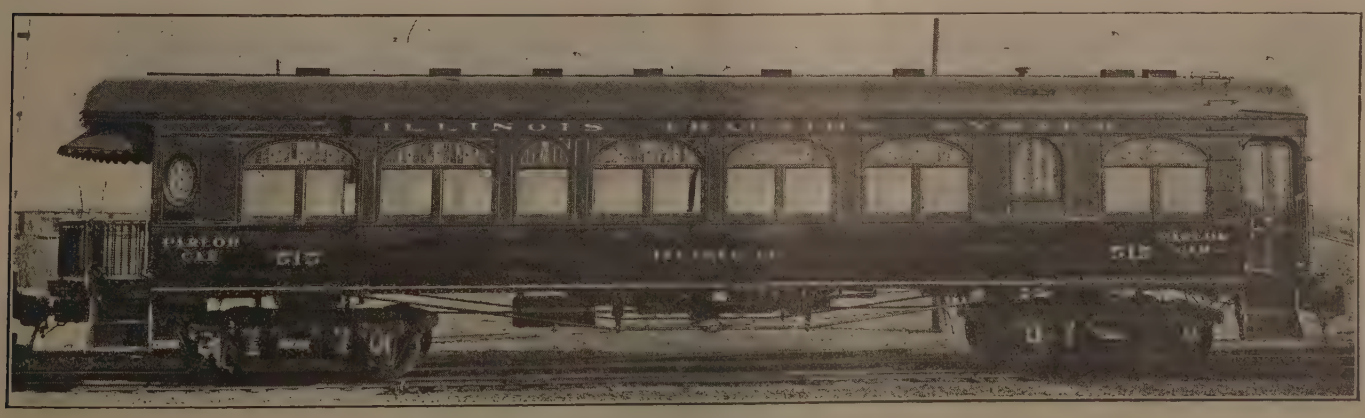
are about 25 m.p.h., including all stops and dead time at junctions.

The parlor cars are added to the limited trains which regularly carry the most through business. In this way the normal electric railway load has better equipment, and inducements are offered which have resulted in building up traffic that formerly made the long runs on the trains of parallel steam railroads.

These parlor observation cars are 57 ft. long, 9 ft. 7⅛ in. wide, are mounted on standard steam-coach steel-frame four-wheel trucks with quadruple elliptic bolster springs, and are equipped with the Sharon type M.C.B. coupler. An interior view of the parlor car is shown. There are eight double seats, twenty-two mahogany chairs and six Pullman type camp stools.

The rates for seats in the parlor cars are approximately ½ cent per mile in addition to regular first-class fare. A minimum rate of 15 cents is observed. All station agents sell seat tickets and make reservations in advance for parlor car seats and sleeping-car berths.

The energy consumption of these limited trains with heavy observation parlor-car trailers, as compared with the same limited motor cars, shows that while the motor car alone consumes about 64 watt-hours per ton mile the same motor car, when hauling the parlor car as a trailer in the same run, consumes about 46 watt-hours per train ton mile.



ILLINOIS TRACTION SYSTEM—PARLOR-OBSERVATION TRAIL CAR

COMMUNICATIONS

Resistance to Car Motion

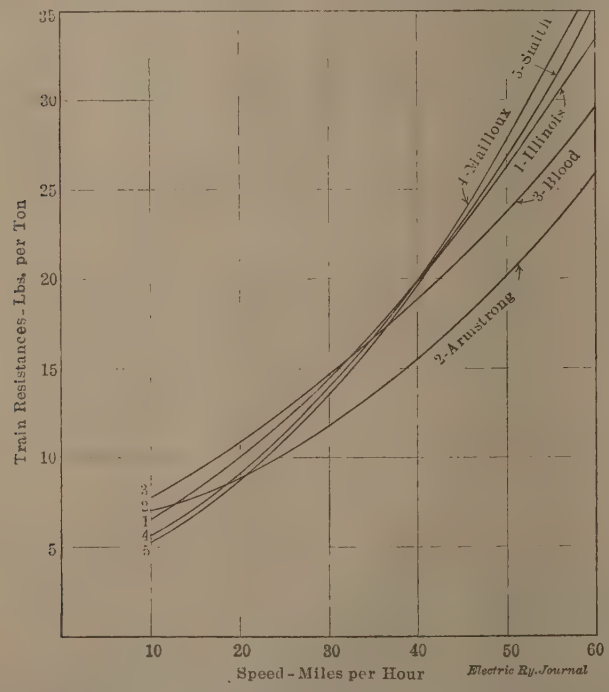
Purdue University
LaFayette, Ind., Aug. 5, 1914.

To the Editors:

I have read with interest the abstract of the University of Illinois Bulletin on train resistance, published in the issue of the Electric Railway Journal for June 20, and the comments by C. O. Mailloux and Louis Bell, in the issue for July 11. Railway engineers are again indebted to the University of Illinois Experiment Station for some valuable experimental work in train resistance measurement.

In the measurement of train resistance so many variable conditions are encountered that it is extremely difficult to secure consistent results. The variation in results obtained for a given speed with apparently similar car and track conditions are well illustrated by the illustration accompanying the abstract which shows the results for a typical individual test. I therefore agree with Mr. Mailloux, in his statement that the coefficients of the second and third terms of the Illinois formula indicate a degree of precision which is difficult of attainment in train-resistance measurements. The method used in making the resistance measurements has possibly as few objections as any in use, but any method involving the use of the difference of two quantities of which one at least cannot be measured with a great deal of precision is hardly ideal. I fear, however, that we shall have as much trouble in learning how to measure train resistance by direct measurement as we have had in deriving the "generalized rational formula" for train resistance that Mr. Mailloux so "devoutly" wishes for.

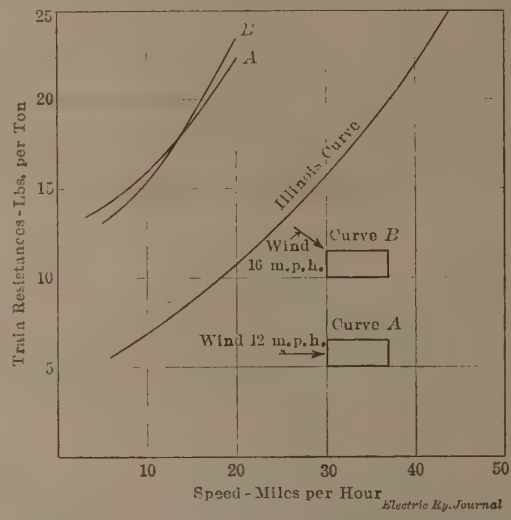
Presumably, the authors of the formula do not claim that it is applicable, except for car and track conditions



TRAIN RESISTANCE—COMPARISON OF ILLINOIS WITH OTHER WELL-KNOWN FORMULAS

similar to those of the tests upon which the formula is based. The abstract gives a comparison between the Illinois curve and the curves obtained by inserting the car constants of the Illinois test car in several other well-known formulas. In order to compare the Illinois formula with other formulas for other car weights and dimensions than those used in the test, I have calculated the train resistance of a 40-ton car with 100 sq. ft. of front end area (these figures representing approximately the proper values for cars used on several interurban railways in the Middle West), using the Illinois and four other well-known formulas. The results are shown in the first illustration and indicate that the Illinois formula compares with the others as favorably for the 40-ton car as it does for the 28-ton car.

I have also been interested in comparing the results of the Illinois tests with those obtained in tests made under my direction at Purdue University during the past year and recorded in a thesis by H. B. Nussbaum, A. C. Davison, K. Wallace and F. B. Lubker. These tests had for their object the determination of the resistance of a small interurban car operating at low speed over track similar to that found in many small and medium-sized cities in the Middle West. Compared with the track of a high-grade interurban railway on private right-of-way this track would be ranked as below the average. The Purdue University test car



TRAIN RESISTANCE—COMPARISON OF ILLINOIS AND PURDUE TESTS

used in making the tests weighs about 27 tons and has approximately the same dimensions as the Illinois car. A comparison of the results is therefore of some interest. Such a comparison is shown in the second figure. Because of the low speeds involved the "coasting method" of determining resistance was used in the Purdue tests. The runs were all made over a certain section of track, which had been carefully surveyed just previous to the tests. As in the Illinois tests, runs were made in both directions over the test section. Curve *A* is the average of 296 determinations of train resistance, and curve *B* is the average of 254 determinations, one half of the runs being made with the wind and the other half against it in each case. The rectangles and arrows in the corner of the figure represent the wind conditions. The two curves shown were selected because they represent sets of data taken under approximately similar conditions of weather. The air temperature for both curves was between 70 and 80 deg. F. and both sets of data were taken on fair days. The individual points on the curve sheets were as badly scattered as those shown in the curve sheet, marked "Typical Individual Test," of the Illinois report. Curves *A* and *B* were obtained by taking the arithmetical averages of the determinations with and against the wind. A method similar to the one outlined in the Illinois report was tried in calculating the results of a few of the tests, but as the speed and wind velocities were low, and as factors other than air resistance seemed to affect the curvature of the

graphs, the method was discarded. While the curves A and B agree fairly well with each other, they show much higher values of train resistance than is shown by the Illinois curve. In presenting these curves of train resistance, it is not intended to disparage in any way the results of the Illinois tests; the idea being to bring out clearly the fact that even when car weights and dimensions are the same, greatly different values of train resistance may obtain. It will be noted that not only are the curves higher up on the sheet, but also that they show a greater curvature than the Illinois curve. Yet at the low speeds involved, the air resistance, to which the curvature of train resistance curves is usually attributed, cannot be an important factor.

The equations of curves A and B have not been worked out, but they would be of the general form of the McClaurin series, $r = A + BS + CS^2$. The constant terms and the coefficients of S^2 in the equations for the curves A and B would have much higher values than the similar terms in the Illinois equation. These differences may be attributed to condition and composition of wheel and rail surfaces; contour of wheel face; shape of rail head; elasticity and alignment of track; rigidity of truck frames; distribution of weight on truck frames; arrangement of trucks with respect to the car body; inequality of wheels on the same truck; condition and kind of gears; nature and composition of lubricants; and kind, condition and composition of bearing surfaces.

Any curvature in the graph of an equation of the form given above is due to the influence of the third term which involves the square of the speed. While it is the common assumption that this third term is chiefly concerned with air resistance, there seem to be very good grounds for believing that factors other than air resistance may also have some influence. Car vibrations and oscillations, truck nosing and truck frame skewing use up some of the tractive effort produced by the motors and, as these disturbances are greatly aggravated by poor track conditions and seem to increase at a greater rate than with the first power of the speed, it is easy to see how both the B and C coefficients may be increased over the values that would obtain for a properly designed car, operating over a first-class roadbed.

Dr. Bell states that the "difficulty of taking care of the air resistance lies in two matters, which have never been really well investigated; first, the actual effect of the shape of the front of the car, and second, the effect of this shape on the lateral drag at high speeds." I would add a third matter, namely, the actual effect of the shape of the rear end of the car. The rear end air resistance certainly is not negligible as compared with the front end air resistance, and it is quite possible that the shape of the rear end has some effect on the lateral drag.

D. D. EWING,
Assistant Professor of Electrical Engineering.

"Proceed, Protected by Flag"

STEUBENVILLE, WELLSBURG & WEIRTON RAILWAY COMPANY

EAST LIVERPOOL, OHIO, Aug. 6, 1914.

To the Editors:

I have just read the editorial in the Aug. 1 issue of the ELECTRIC RAILWAY JOURNAL entitled "'Proceed, Protected by Flag'—A Fallacy?" I am strongly against any so called "proceed by flag" rule. A general rule of this nature, while it is very seldom if ever required by a regular scheduled train, is too apt to be seized upon by extra trains with the intention of forcing themselves over the road in the face of opposing regular scheduled trains. Consequently, it is sure to be a very dangerous method of operation.

In the case of block signal operation, I can see that certain instances could arise in the operation of regular scheduled trains whereby some rule should be provided to allow its scheduled operation; for instance, where the train is passing the piece of track over which the regular schedule gives it the right to travel and is approaching a regular scheduled meeting point but is stopped by the failure of a signal to operate, the dispatcher's telephone line being out of commission at the same time. In this case the opposing regular scheduled train would not be allowed to pass its meeting point until the one blocked by the inoperation of the signal had arrived. This is the only possible case to my mind that a rule should be worked out allowing such train to proceed and fulfil its regular rights, but in no wise should any rule allow an extra train of any nature to proceed beyond an inoperative block signal except under the provisions of rules 166 and 167.

W. R. W. GRIFFIN, General Manager.

BOSTON ELEVATED RAILWAY COMPANY

BOSTON, MASS., Aug. 8, 1914.

To the Editors:

With reference to the editorial entitled "'Proceed Protected by Flag'—A Fallacy?" in your issue of Aug. 1, my opinion is that a serious delay that is caused by a complete failure of the signal or dispatching system, and that lasts until such time as operation can be again restored to a safe basis, is preferable to a rule which offers opportunity for a serious catastrophe. If "safety first" means what it says we should not lay ourselves open, if it is possible to prevent it, to one of those harrowing collisions which, the moment they occur, shake the public confidence in the safety of block signals. Under certain local conditions, due to a sparsely settled territory and infrequent service, it may well be that some flagging rule should be devised in order not to tie up the system when telephone communication or signals fail, but it seems to me that only under such conditions is it justified.

EDWARD DANA,
Assistant Superintendent of Surface Lines.

NEW YORK, Aug. 10, 1914.

To the Editors:

Your editorial in the Aug. 1 issue on "Proceed, Protected by Flag," is timely. It is my judgment that the rule is not good practice; this on the assumption that operation at high speed is comprehended.

The energies of modern electric railway operation are being directed toward providing greater safety of movement, as witness the development and use of automatic block signals for single track. Such a rule leaves an opening for the failure of the human factor under conditions where such a failure is most likely to occur.

L. H. PALMER.

A municipality in the United Kingdom has applied for sanction to borrow $109,500 with which to purchase twenty-five electric tramcars. The extensions which have been made in the various car routes and the increased traffic will require the utilization in the near future of fifty to seventy-five new cars. About half of these will be built in the company's shops, and the remainder will be purchased. These cars will be of the "double deck" type, inclosed both above and below. Interested American manufacturers may obtain the address of the manager of the tramways by writing to the United States Bureau of Foreign and Domestic Commerce and referring to No. 13,388.

Gergal & Santa Fe Three-Phase Railway —The First Spanish Heavy Electrification

The Gergal & Santa Fé Railway—a three-phase regenerative system which forms an electrified section of the South of Spain Railway is described in a recent article in the *Electric Railway and Tramway Journal.* This line serves an important part of the country situated between Linares and Almeria, and especially the mineral region near Almeria. In 1906 the iron ore traffic of this district became so heavy that the company found great difficulty in carrying on the steam service, especially between Gergal and Santa Fé, inasmuch as the line on this particular section has grades up to 2.8 per cent. The track is of 5-ft. 9-in. gage, which is usual in Spain, and is laid with 73½-lb. rails. This is the first heavy electrification in Spain.

The weights of the trains hauled are about 150 tons, empty, mounting toward Gergal, and 450 tons, loaded, descending toward Santa Fé. Electric locomotives are used solely for the ore traffic, while the less important passenger service is still carried on by steam locomotives. Electrification has raised the up-grade speed from 7 m.p.h. to 15½ m.p.h. and has enabled far heavier loads to be hauled. The time-table is so arranged that two trains run at the same time in each direction and cross each other near the middle of the line at Fuenta Santa. The layout of the line lent itself well to three-phase regeneration, as the descending trains are much heavier than the ascending ones.

Power Generation and Distribution

Power is supplied from a steam station located at Santa Fé at one end of the present line, but midway of the complete Gergal-Almeria electrification. Current is generated at 6000 volts, twenty-five cycles by a 750-kw alternator. The contact line comprises two 8 mm (No. 0) copper wires, the rails serving as the third conductor. The suspension is usually of span type, either with poles or bridges. At stations and in the open the height of the contact wires above the rails is 18 ft. 2 in.; in tunnels, the height varies from 16 ft. 5 in. to 15 ft. 9 in. On open track the span wire is attached at each end to two Ambroin insulators. Galvanized iron clamps permit the span wire to be adjusted vertically to allow the height of the contact wire to be regulated, especially on curves.

Porcelain insulators are used in tunnels and at stations to economize space. The poles are usually 115 ft. apart on tangents and 72 to 92 ft. on curves. The trolley wires are fixed to the span wire by double ebonite and porcelain insulators, each of which has been tested at 10,000 volts, so that the suspension as a whole can withstand 40,000 volts. The line is protected against atmospheric discharges by Wurts lightning arresters. The rails were first bonded with metallic paste, but since then Carpentier-Riviére flexible bonds have been installed. The rails are cross-bonded every 328 ft.

Rolling Stock

In choosing the type of locomotives one of the factors which had to be considered was that the load per axle must not exceed 13 tons. The weight of the locomotive was fixed at 52 tons divided upon four driving axles. Each locomotive was built according to the normal twin-coupled design, namely, two axles and two motors per body. In case a half-locomotive is operated, the current collector of the half not in use is dismounted and placed on the other locomotive. The use of a second collector avoids interruptions of current and assures better acceleration. The electrical equipment of the locomotives was constructed by Brown Boveri & Company, and the mechanical equipment by the Ateliers Suisses pour la Construction des Wagons. The first five half-locomotives are of wood, constructed like Spanish box-type freight cars. The leading data of a half-locomotive follow:

Length outside buffers	24 ft. 5 in.
Length between axles	13 ft. 1 in.
Wheel diameter	47 in.
Weight of mechanical equipment	13 tons
Weight of electrical equipment	13 tons
Total weight	26 tons
Adhesion weight	26 tons
Hauled weight toward Gergal, without locomotive	75 tons
Hauled weight toward Santa Fé, without locomotive	225 tons
Weight of motor, including gearing	3 tons

The pole-changing connections of these three-phase, 220-hp (hour rating) motors permit speeds of 7.5 m.p.h. or 15.5 m.p.h., depending upon the use of twelve or six poles. The gear ratio is 1:4.5. At the lower speed the motors have a continuous rating of 160 hp each, and the tractive effort is 45 per cent greater. The contact voltage is stepped down by means of three-phase motor-ventilated transformers, and current is supplied to the motor terminals at 450 volts.

ASSOCIATION NEWS

COMMITTEE ON EDUCATION

The committee on education met at association headquarters on Aug. 12 and 13 to consider the preliminary report which had been prepared by the chairman. Martin Schreiber, engineer maintenance of way Public Service Railway; Prof. A. M. Buck, University of Illinois, and H. H. Norris, Electric Railway Journal, chairman, were in attendance. The committee reviewed the results of a questionnaire recently conducted to ascertain the present practice of the member companies in regard to apprentice and other employee training. The curriculums which had been prepared for certain correspondence courses were studied in detail and amended. The committee had arranged with a well-known correspondence school to outline several courses suitable for shop, line, power plant, track and other electric railway employees, working under the authority granted by the executive committee in making these preliminary negotiations. After revision the curriculums will be resubmitted to the correspondence school and if acceptable will be included in the committee's report.

The response to the efforts of the committee to interest educational institutions in sending representatives to the Atlantic City convention was considered and the importance of this matter was emphasized by Mr. Schreiber. While the committee agreed that the initiative should be taken by the educational institutions, as a matter of fact they have not done it, and the association has a duty in this direction.

MANUFACTURERS' ASSOCIATION

Secretary McConnaughy's latest circular to the prospective exhibitors at the Atlantic City convention relates to the supply of 110-volt d.c. power which is to be furnished free in reasonable quantities. All electrical connections are to be tested out on Friday, Oct. 9.

At a recent prosperity dinner given in San Francisco John A. Britton, vice-president and general manager Pacific Gas & Electric Company, showed wherein public service corporations have contributed to the welfare of the State. In all communities, he said, there are two main factors—transportation and lighting and industrial motor service—the success of which marks the success of the community and its people. Of primary importance is the matter of transportation.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

New Haven Railroad Construction Notes—Pulling 7/8-In. Messenger Cable

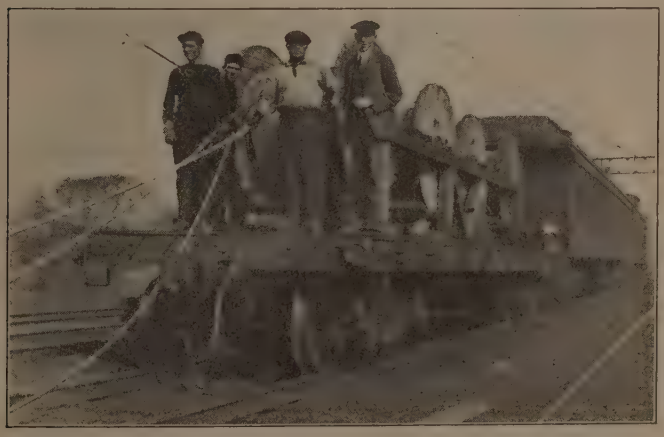
BY R. M. M. BURTNETT, FORMERLY INSPECTOR NEW HAVEN RAILROAD ELECTRIFICATION

One of the most interesting jobs in the electrification of the New Haven Railroad was the pulling of the 7/8-in. steel messenger cable. These cables averaged about 1 mile in length and weighed about 5 tons. The train used for pulling them was composed of an engine, tool car, a derrick, a tower car and reel car. The reel car was loaded with four reels of 7/8-in. steel cables, as shown in one of the accompanying views. At the point from which the 7/8-in. steel cables were to be pulled the reel car and coach were cut off and anchored by chaining the reel car to the rails. Then the end of each cable was taken to the top of the tower car and connected to an iron plate which had eight holes in it, four for the 7/8-in. steel cable and four for the straps with which the cable was pulled. A 5/8-in. steel cable strap about 6 ft. long was attached to this plate; a second 5/8-in. steel cable strap that reached from the center of the boom of the derrick, provided with hooks on the ends to hook into the plate, held the cable which rested on the tower car while they were being pulled from the reel car to the bridge, and so on from bridge to bridge. After the cables had been attached to the plate the train would move until the tower car was under a bridge. The derrick was then raised and the load line was taken over the top of the bridge and hooked into the shorter 5/8-in. strap. Then the load line was taken up until the other strap was slack. Next the hooks were removed and the train went ahead, the cable being pulled with the load line of the derrick until it was clear of the bridge. Then the derrick was lowered until the plate and cable lay on top of the tower car. Following this the longer strap was hooked into place and the train was run ahead to the next bridge.

When all the cable was out, sockets were put on and connected to the anchor bridge of the previous run of cable. The cables were then pulled up into the clear, one at a time, by the engine of the train. The movements of the train were controlled over a telephone line that had been distributed by the train from the anchored reel car as the run was made. If the cables were long enough they were dead-ended at the anchor

TRAIN WITH DERRICK AND TOWER CAR

TOWER CAR IN OPERATION BETWEEN BRIDGES



REEL CAR—THE TELEPHONE IS AT THE REAR OF THE CAR ON THE RIGHT

VIEW OF PLATE, SHOWING ALSO THE LIFTING OF FOUR CABLES OVER A BRIDGE

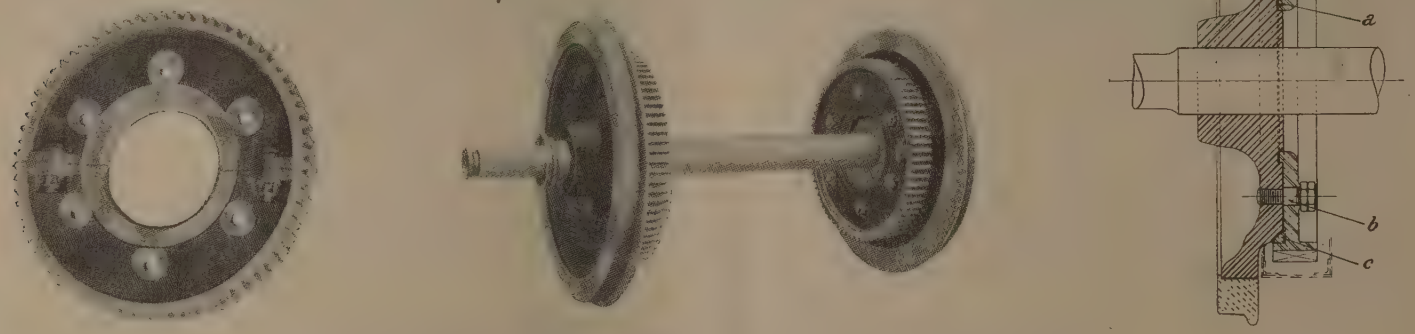
bridge at the other end of the run; otherwise they were dead-ended at the intermediate bridge which had previously been guyed to take the load. After the runs of cables between anchor bridges had been made the wires were separated and put in place over their respective tracks. In some cases we used the boom of the derrick to lift them into place; in other cases the work was done by the field force. Once the cables were in place they were sagged, after which the cables were ready to receive the I-beams, insulators and current-carrying wires.

It may be added that to facilitate the moving of the wires over the catenary bridges and to prevent them from shifting and so fouling other tracks, we installed on the top member of each bridge an iron roller, which was composed of four sections mounted on a wooden block and furnished with a common clamp to hold each wire in place.

Double-Gear Drive for Street Railway Motors

BY C. S. STEAD, A. M. I., MECH. E., ENGINEER TO THE M & G TRUCK & ENGINEERING COMPANY, LTD., LONDON, ENGLAND

With reference to Mr. Blackburn's article in your issue of July 4, relating to the double gear drive, a short description of the method employed to utilize the double gear for street cars operating on a track of 3 ft. 6-in. gage may be of interest. Owing to the amount of space taken up by the motor, it was impossible to fix an additional gear on the axle. It was therefore decided to attach the gears to the centers of the truck wheels. This was carried out in the manner shown in the accompanying drawing.



BIRMINGHAM DOUBLE GEARS AND DETAIL OF INSTALLATION

The wheel centers are of pressed mild steel carefully machined on the inner face to receive the cast-steel gears. The gears are secured in position by turned mild steel studs, *b*, in reamed holes. An annular projection, *a*, on the gear engaging with a corresponding groove in the wheel center preserves the concentricity. The studs are relieved of all driving stresses by two lugs, *c*, situated on the inner edge of the gear rim, which are an accurate fit in machined recesses located in the wheel center. This arrangement is the patented invention of Messrs. Baker and Dickinson of the Birmingham (England) City Tramways.

More than 180 car trucks (single and double truck) supplied to the Birmingham tramway system by the writer's firm, have been fitted with wheels upon which this type of double drive has been adopted, and the results obtained during the past two to three years have been exceedingly satisfactory. A distinct advantage obtained by the attachment of the gear to the road wheel center instead of keying the gear to the axle has been found in the freedom from broken axles.

Previous to the introduction of the double drive fractured axles, chiefly at the keyway, were a too frequent occurrence. This trouble is now entirely eliminated. At first sight it would appear as if much trouble would be experienced in obtaining correct alignment of the gears on axle, but by the use of suitable jigs and gages, during manufacture, strict accuracy has been maintained. The gears have seventy-one teeth, the pinions on the Dick-Kerr 19A motor have fifteen teeth.

A second view shows the gear wheel and a third view the wheels and axle with the gears in position.

A Home-Made Traveling Crane

At the Carew Street shops of the Springfield (Mass.) Street Railway effective use is made of two traveling cranes built by the company at a nominal cost. One of these cranes is illustrated in the accompanying halftone, its location being the carhouse storage section adjoining the local forge shop. The crane is built of a main wooden member 7-in. x 8-in. in section, with 7¼-in. x 7½-in. cross pieces near the ends, and a steel bar runway for block and tackle holders at the bottom. The capacity of the hoist is 4 tons, and the runway is 12 ft. long. The cross timbers are each 6 ft. long and are braced against the main member by ⅝-in. tie rods provided with turnbuckles. They are reinforced at the bottom by iron plates 1 in. thick and 6 in. wide. The hoist blocks are carried by hooks and eyes supported from the runway rollers by ½-in. x 2½-in. wrought-iron bars hung from 1¾-in. x ⅜-in. bars by ⅞-in. bolts, the upper bars being attached to the runners by ¾-in. bolts. The runway is attached to the main horizontal member by clamps 30 in. apart. The crane was built at a cost not exceeding $125, including all items relating to labor and material.

HOME-MADE CRANE OF 4-TON CAPACITY AT SHOPS OF SPRINGFIELD STREET RAILWAY

Changes In and Equipment For Car Wiring

BY R. H. PARSONS, ELECTRICAL FOREMAN

If one happens to glance under cars which were wired ten years ago and those which have been equipped within the last six or seven years, most striking differences will be observed. On looking now at the cars in service a decade or more with the original wiring one must wonder how they keep running. The wires and cables are hung around promiscuously in positions where they get the full benefit of the wheel wash or where they are rubbed by the gear cases, motor shells, wheels, etc. The resistors are hung by a couple of bolts down through the car floor, the controllers stand on the platforms with no protection for the cable leads which come in at the bottom and the circuit breakers hang loosely from the bonnet with all the woodwork around scorched from flashes. Further, the cables and wires usually are found to be composed mostly of poor wire, poor splices and screw connectors, while the beams and sills of the car underframe are frequently burned and charred because of short-circuited wires.

On a wet day it was not unusual for passengers to get a bad shock as soon as their feet touched the pavement because of leakage of current through the insulation of the old-time wires; nor was it a rare occurrence for the controller to blow up after seriously burning the motorman and causing panics among the passengers. In almost every one of these cases the controller would be found to have a good-sized hole burned in the cover. The connection board nearly always was found heavily carbonized and covered with many coats of shellac or paint while the wires would be found loose and full of screw connectors.

INTRODUCTION OF CONDUIT

The rules of the fire insurance companies, and still more the desire of progressive railways to avoid burnouts and failures led to the use of conduit and to giving more attention to the location of electrical apparatus for accessibility and safety. Junction boxes and other devices are now used to make watertight joints for the conduit, fire-resisting material is adopted wherever there is any danger from heat or flame, and more care is used in soldering connections. The conduit is grounded to prevent shocks to passengers, and generally the condition of the wiring and other electrical parts is no longer a secondary matter, as was formerly the case.

While it is important that cars fitted for multiple unit control should receive more attention because of the number and importance of the smaller wires, nevertheless if an ordinary car with K control is equipped with conduit completely, using care as to junction boxes, outlets, etc., the investment due to absence of failures and long life of the wiring will also be found to bring ample returns.

Below will be found a list of material, etc., necessary to equip a 45-ft. car with two K controllers and two motors. Although this amount will vary depending on location of apparatus, size of car and equipment, system of lighting, heaters and buzzers, the figures given will generally be found of use when equipping new cars.

WIRING EQUIPMENT FOR A 45-FT. DOUBLE-END CAR WITH TWO MOTORS

Item	Number or Quantity
Lamp receptacles—brass skirt type	17
Lamp receptacles—plain wall socket	2
Lamp receptacles—headlight socket	2
Main light switch	1
Three-way switch for headlights	1
Lamps	21
Connectors for motor leads	8
1-in. circular loom for motor lead connectors	4 ft.
Seven-conductor cable made up of—three No. 4 wires, four No. 2 wires	52 ft.

WIRING EQUIPMENT FOR A 45-FT. DOUBLE-END CAR—(Continued)

Seven-conductor cable made up of—two No. 4 wires, four No. 2 wires, one No. 0 wire	52 ft.
No. 0 strand wire—trolley	125 ft.
No. 2 strand wire—motor lead taps	35 ft.
No. 4 strand wire—resistance taps	35 ft.
No. 12 strand wire—heaters	210 ft.
No. 14 strand wire—lighting, pump and buzzers	500 ft.
2-in. conduit—for main cables	50 ft.
1¼-in. conduit—for resistance wires	6 ft.
1- in. conduit—for motor leads	15 ft.
¾-in. conduit—for light, heater and compressor circuits	150 ft.
½-in. conduit—for light, heater and compressor circuits	30 ft.

Junction boxes—

¾-in. x ¾-in. x ¾-in. T	19	¾-in. x ¾-in. x ½-in. T	2
¾-in. straight	1	1¼-in. straight	2
¾-in. x ¾-in. L	2	1-in. straight	2

Chase nipples, 1-in.	1
Chase nipples, ½-in.	1
Floor flanges for ¾-in. pipe	16
Conduit insulating joints—½-in.	2
Conduit T's—½-in.	2

Conduit lock nuts—

2-in.	20	¾-in.	8
1¼-in.	4	½-in.	10
1-in.	8		

Conduit end bushings—

2-in.	12	¾-in.	17
1¼-in.	2	½-in.	6
1-in.	4		

Conduit couplings, right and left, ¾-in.	11
Conduit couplings, ½-in.	4

Pipe straps—

1-in.	25	½-in.	5
¾-in.	25		

Lead washers for conduit—

2-in.	12	1-in.	4
1¼-in.	2	¾-in.	4

Lag screws for heavy junction boxes, etc.—

⅜-in. x 2¼-in.	52	⅝-in. x 1½-in.	16
⅝-in. x 3¼-in.	2	½-in. x 3-in.	2
5/16-in. x 2-in.	2	½-in. x 2-in.	4
⅝-in. x 2½-in.	2		

Bolts, machine—

⅜-in. x 2-in.	4	⅜-in. x 3-in.	8
½-in. x 1½-in.	2	⅜-in. x 2½-in.	4
½-in. x 3½-in.	2	½-in. x 2-in.	2

Bolts, carriage—

⅝-in. x 3½-in.	26	⅜-in. x 2½-in.	8
⅜-in. x 3-in.	2	½-in. x 4½-in.	12
⅜-in. x 2½-in.	8	⅝-in. x 6-in.	1
⅝-in. x 5½-in.	8		

Lock washers—

⅜-in.	33	⅝-in.	4
½-in.	18		

Flat washers—

⅜-in.	32	⅝-in.	6
½-in.	16	⅞-in.	6

Screws—

2-in. No. 14 flathead	8	1¼-in. No. 7 right-hand	24
1-in. No. 9 flathead	8	1-in. No. 10 flathead	50
1-in. No. 10 right-hand	50	1½-in. No. 16 flathead	4
1¾-in. No. 12 right-hand	12	1½-in. No. 10 right-hand	12
1½-in. No. 16 flathead	4	⅜-in. No. 6 right-hand	40
¾-in. No. 8 right-hand	40		

Iron—

½-in. x 2-in. flat	10 lb.	⅜-in. x 1½-in.	12 lb.
⅝-in. x 1½-in.	37 lb.	3/16-in. x 1¼-in.	1 lb.
¼-in. x 1¼-in.	1 lb.	⅛-in. x 1-in.	1 lb.
¼-in. x 2-in.	2 lb.	¼-in. x 1½-in.	6 lb.
¼-in. x 1-in.	½ lb.		

¼-in. asbestos lumber	30 sq. ft.
Oak	38 ft.
Maple	6½ ft.
Ash	3½ ft.
Insulating paint	1 gallon
Solder	5 lb.
¾-in. friction tape	3½ lb.
2-in. friction tape	4 lb.
¾-in. rubber tape	3 lb.

The foregoing material includes all that is used for installing the electrical equipment, to wit, hanging the resistance fastening, all junction boxes, cleating all conduit boards for circuit-breakers and fuse boxes, motor lead brackets, light fixtures, switches, setting up controllers, grounding conduit, placing of heaters, etc.

In connection with the foregoing: As pipe straps and flat washers are ordered by the pound it will be useful to know how many of these make up a pound.

FLAT WASHERS PER POUND

Size	No.	Size	No.
3/16-in.	337	⅞-in.	6
¼-in.	132	1-in.	5
⅜-in.	97	1⅛-in.	5
½-in.	23	1¼-in.	3
⅝-in.	12	1½-in.	2
¾-in.	9		

PIPE STRAPS PER POUND

Size	No.	Size	No.
⅜-in.	33	1-in.	18
½-in.	25	1¼-in.	10
¾-in.	15	2-in.	7

In figuring the weights on a car it will be found useful to know what standard conduit and air pipe weighs per foot.

Conduit Size	Weight	Air Pipe Size	Weight
⅜-in.	8.4 oz.	⅛-in.	4 oz.
½-in.	14.0 oz.	¼-in.	5 oz.
¾-in.	17.2 oz.	⅜-in.	8 oz.
1-in.	26.4 oz.	½-in.	12 oz.
1¼-in.	34.4 oz.	¾-in.	16 oz.
2-in.	53.6 oz.	1-in.	24 oz.
2½-in.	84.8 oz.		

Insulated wire purchased on specifications best suited for car work weighs per foot as follows:

Size	Weight	Size	Weight
18-strand	0.8 oz.	2-strand	4.0 oz.
14-strand	1.6 oz.	No. 0 strand	7.2 oz.
12-strand	1.9 oz.	No. 4 flexible	4.0 oz.
10-strand	2.0 oz.	No. 2 flexible	5.6 oz.
4-strand	3.6 oz.		

The size of conduit which should be used for various sizes of wires is as follows:

No. of Wires	Size Wire	Size Conduit	No. of Wires	Size Wire	Size Conduit
1	0	¾ in.	1	10	⅜ in.
2	0	1¼ in.	2	10	½ in.
			3	10	¾ in.
			4	10	¾ in.
1	2	½ in.*	5	10	¾ in.
1	2	¾ in.	6	10	1 in.
2	2	1 in.*	1	12	⅜ in.
3	2	1¼ in.	2	12	½ in.
4	2	1¼ in.*	3	12	¾ in.
			4	12	¾ in.
1	4	½ in.	5	12	¾ in.
2	4	¾ in.*	6	12	1 in.
3	4	1 in.	7	12	1 in.
4	4	1¼ in.	8	12	1 in.
5	4	1¼ in.	9	12	1¼ in.
6	4	1¼ in.*	1	14	⅜ in.
1	6	⅜ in.	2	14	½ in.
2	6	¾ in.	¾	14	½ in.
3	6	1 in.	5	14	¾ in.
4	6	1 in.	6	14	¾ in.
5	6	1¼ in.	7	14	¾ in.
6	6	1¼ in.	8	14	1 in.
7	6	1¼ in.	9	14	1 in.
8	6	1¼ in.*	10	14	1 in.
			11	14	1 in.
			12	14	1 in.

This table is for wire insulated for car work, and is for the sizes mostly used in the equipment of cars.

*Only on a short, straight, easy pull.

The greatest number of wires of different sizes which can be safely pulled into various sizes of conduit follow:

⅜-in. conduit—	
1 No. 6 wire.	1 No. 12 wire.
1 No. 10 wire.	1 No. 14 wire.
½-in. conduit—	
1 No. 2 wire.	1 No. 10 and two No. 14 wires.
1 No. 4 wire.	1 No. 10 and 2 No. 12 wires.
1 No. 6 wire.	2 No. 12 wires.
2 No. 10 wires.	4 No. 14 wires.
¾-in. conduit—	
1 No. 2 and 2 No. 14 wires.	2 No. 6 and 2 No. 14 wires.
1 No. 2 and 1 No. 12 wires.*	2 No. 6 and 1 No. 12 wires.
2 No. 4 wires.*	2 No. 6 and 1 No. 10 wires.
1 No. 4 and 4 No. 14 wires.	1 No. 6 and 4 No. 14 wires.
1 No. 4 and 3 No. 12 wires.	1 No. 6 and 3 No. 12 wires.
1 No. 4 and 3 No. 10 wires.	1 No. 6 and 3 No. 10 wires.
1-in. conduit—	
1 No. 0 and 1 No. 6 wires.	3 No. 4 and 3 No. 14 wires.
1 No. 0 and 4 No. 10 wires.	3 No. 4 and 2 No. 10 wires.
1 No. 0 and 4 No. 12 wires.	3 No. 4 and 2 No. 12 wires.
1 No. 0 and 5 No. 14 wires.	4 No. 6 and 2 No. 14 wires.
2 No. 2 and 2 No. 12 wires.*	4 No. 6 and 1 No. 12 wires.
1 No. 2 and 2 No. 4 wires.	4 No. 6 and 1 No. 10 wires.
1 No. 2 and 2 No. 6 wires.	8 No. 10 and 1 No. 14 wires.*
1 No. 2 and 4 No. 10 wires.	1 No. 14.
1 No. 2 and 5 No. 12 wires.	
3 No. 4 and 1 No. 6 wires.	8 No. 12 and 1 No. 14 wires.

*Only on a short, straight, easy pull.

Report on Air in Paris Subways

In a recent issue of *The Engineer*, London, England, is a condensed report on some experiments as to the air in the Métropolitain and the Nord-Sud subways of Paris. The experiments were conducted by the Conseil Hygiene of Paris, and covered a period of two years. The report just issued shows that the air on the Métropolitain is much more vitiated than on the Nord-Sud. The principal cause of the trouble is attributed to the rails. On the Métropolitain the wear is very pronounced, especially owing to braking, in the stations; but on the Nord-Sud the rails are, apparently, of harder steel, and the braking has had little effect. On the former line the brake shoes are of cast iron; on the latter, they are faced with a tar-treated fabric, and, incidentally, the trains on the Nord-Sud stop much more smoothly and with less noise. The report refers to the fact that the floor of the coaches on the Métropolitain has longitudinal strips along the upper surface, so cannot be swept clean, but on the Nord-Sud the floors are covered with a conglomerate material forming a uniform and non-slipping surface, which can be cleaned with sawdust. It is therefore proposed that in these matters the Métropolitain should follow the example of the Nord-Sud, also that the ballast in and near the stations be covered by tiles, which can be swept, so as to reduce the dust.

Porcelain Runways on Section Insulators

BY JAMES SCOTT, SUPERINTENDENT OF OVERHEAD CLEVELAND RAILWAY

As the Cleveland Railway Company had been troubled by the burning and wearing away of the wooden runways on section insulators, it was decided to look around for a substitute. Several different materials were experimented with and finally a porcelain runway of the type shown in the accompanying illustration was adopted.

PORCELAIN RUNWAY IN CLEVELAND SECTION INSULATOR

We have, at present, twelve section insulators equipped with the porcelain runways. These runways have been in use for more than six months and they have yet to show defects. When the wooden runways on the insulators began to wear into "half moons," they caused the trolley to pound and break the wire. The permanent alignment of the porcelain runways overcomes this trouble.

Proposed French Monorail

A scheme for a suspended monorail railway has recently been submitted to the Minister of Public Works in France by M. Mähl, a French engineer. It is claimed that a speed of 150 m.p.h. may be attained with safety on this proposed railway. The track, either single or double, is to be carried 20 ft. to 25 ft. above the ground by catenary suspension. As planned, the trains will be composed of small sections freely articulated and will easily take curves of 1 km (3280 ft. 10 in.) radius and gradients of 1 in 20. Each train section will be suspended from two wheels about 1 m (39.37 in.) apart. There will be only one row of seats, placed longitudinally.

Electric Safety Brake

The Third Avenue Railway, New York, has recently equipped one of its storage battery cars with a new form of electric brake developed by the Electric Safety Brake Company, Philadelphia, Pa. This brake apparatus consists essentially of a pulling or braking cylinder for transmitting power to the truck levers and a controller for controlling the amount of current supplied to the cylinder. The cylinder is a reciprocating or sliding electric motor somewhat resembling an air-brake cylinder. This cylinder is 14 in. in diameter x 42 in. x 50 in. long, with a pulling movement of 12 in. The construction of the cylinder is very similar to that of a d.c. motor, in that it has suitable field magnets energized by separate field coils and a reciprocating or sliding armature with windings, commutator and brushes—imparting a reciprocating instead of a rotary motion. To the armature are attached rods which pass out through the cylinder heads, and attached to these rods is a crosshead to which the usual brake levers are attached.

The winding and arrangement of the cylinder is so proportioned that the movement or pull is smooth and constant throughout its entire length of travel. The amount or strength of the pull is governed by the amount of current supplied, and under normal conditions is from 0 to 1000 lb. for small single-truck cars, and 0 to 1500 lb. for the cylinders of larger truck cars with a maximum current of 75 to 90 amp.

In this type of brake the cylinders either push or pull, as may be most convenient. They are mounted underneath the car body, like an air-brake cylinder, and are connected to the truck levers by any suitable rigging. The cylinder levers are connected to the hand-brake staff and wheel in such a way that at every application of the brake or movement of the levers, the hand-brake staff is operated and all slack is taken up. Hence simply by latching the brake ratchet dog the brake is held applied indefinitely.

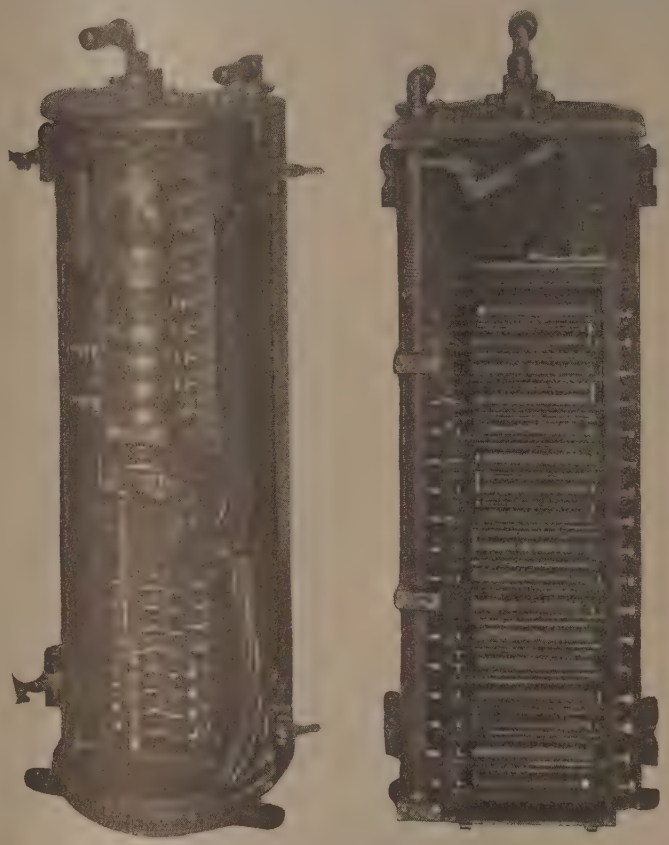
The controller is separate but can be made integral with the main controller. In installing, it is located beside the main controller in the space usually occupied by the air-brake valve and piping. It is connected with the main controller with an interlocking device which prevents the operation of both controllers at the same time. This arrangement prevents the use of power with brake applied or the application of the brake until the power is shut off in the main controller.

The controller consists of two separate parts, the first being the necessary connections, cut-outs, and apparatus for converting either of two motors to a generator to supply energy to operate the cylinder, and the arrangement for controlling this generated current; second, the necessary switches, connections and adjustable variable resistance for the control and application of trolley current for operating the cylinder in emergency, when the car is standing, or at any other time desired. An interlocking arrangement prevents the use of trolley and generated current at the same time.

As the controllers are mounted beside the main controller the only wiring necessary is the circuit for trolley current, one line being from the controller to the cylinder with short connections between the brake and car controllers by which the armature and field leads of two motors are brought into the brake cylinder. All of these wires carry current and are necessary for traction; necessarily any disarrangement would be noticed in propelling the cars and before the need for applying the brakes, thus making the apparatus safe against broken wires.

The apparatus for the control of the generated current consists of a connecting board with a cut-out switch, by means of which one motor is connected for generating use when the switch is thrown to the right, and the other motor connected when thrown to the left. Further, by placing the switch in the center both motors are cut out of the brake controller. From the connecting board and switch suitable connections are made to the fingers and contact points in the controller drum.

The operation is as follows: When the car controller is on the off position, the handle on the brake controller is thrown one notch to the right for car moving ahead, or one notch to the left for the reverse direction. In this position the armature connections to the motor that may be cut in to generate current for braking are broken and are reverse-connected to the field leads from the same motor. Connection is also made with the cylinder, the windings of which are connected in series with the armature, so that all current generated must



FRONT AND BACK OF CONTROLLER

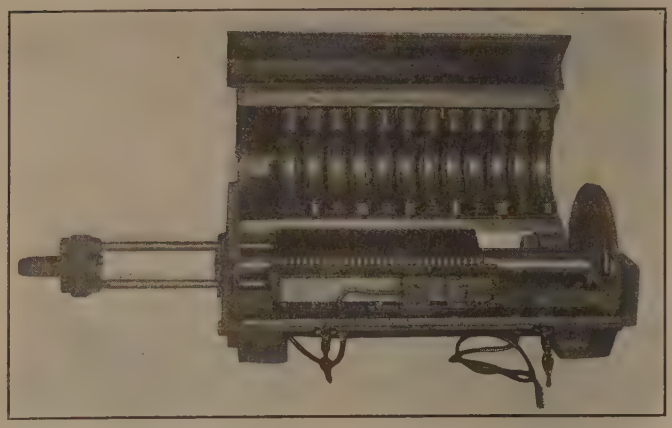
flow through these windings and be used in the operation of the cylinder. In this position a contact is made which places a short-circuit across the field windings of the motor, thus preventing building up or generating in this position, although all other connections are complete for this purpose.

Further movement of the brake handle removes this short-circuit across the fields, which immediately receive current and energize very quickly, and the motor begins to generate current to apply the brake. Wired in series with the armature is a small solenoid set to operate at a low voltage. When the generated voltage reaches this predetermined amount, the solenoid acts to cut in a variable resistance circuit across the field windings. This resistance consists of a small number of clamped carbon blocks, operated by the movement of the controller handle. The movement of the handle causes more or less pressure on the blocks and consequently less of more resistance through them.

At the moment that the solenoid operates to cut in this resistance and current across the fields, the carbon blocks are clamped firmly together to insure little resistance. Hence much current that otherwise would flow through the fields flows through this circuit, with a consequent weakening of the field, and a retardation of

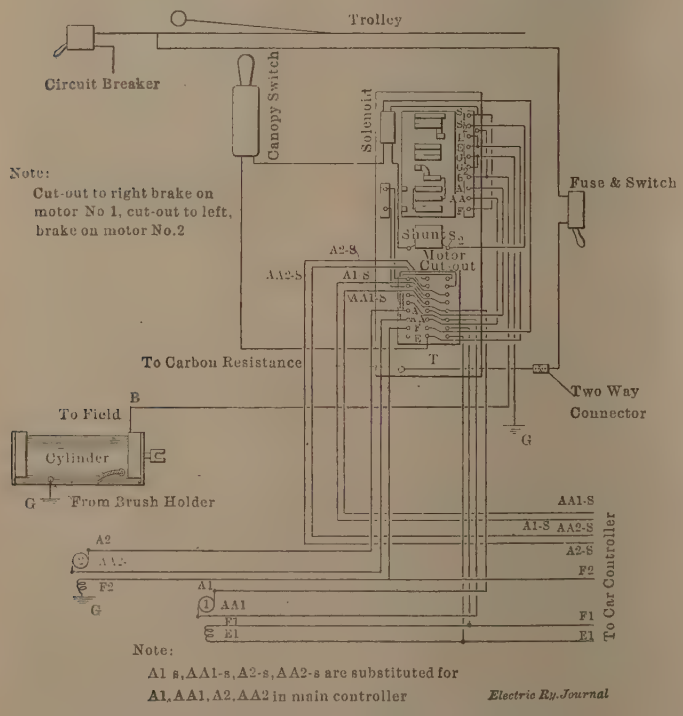
the generating of additional voltage. Thus a high voltage is prevented, and the brake is very lightly applied. A further movement of the handle causes a decrease of the pressure on the carbons, and increased resistance in the short circuit. Therefore, more current flows through the fields and higher voltage current is generated to apply the brake to the desired strength.

It might appear that if the brake handle is moved too



ELECTRIC SAFETY BRAKE CYLINDER OPEN

far, too much current would be generated and the brakes would therefore be applied so hard that skidding would ordinarily take place. This does not occur, however, because the slowing down of the wheels, and the consequent lessening of the speed of the motor armature, decreases the amount of current generated. Consequently, the pull of the brake cylinder would at once be reduced automatically to a point where the two forces would be equalized, and the proper braking of the car would be as rapid as wheel and rail conditions permit. A lesser movement of the handle results in generating a lower



WIRING DIAGRAM FOR ELECTRIC BRAKE

current and consequently lower pressure on the brakes. The return of the handle to the first notch again places the short-circuit across the fields, immediately stopping the generating of current and causing the immediate release of the brakes.

The short-circuit across the fields prevents current from flowing through or flashing at the various contacts, when the brake handle is brought to the center, the generating connections are broken and the power connections made. The trolley or emergency switch consists of a large number of carbon blocks normally held together with but little pressure. The operation of the switch handle first closes the double switch to close the circuit. As there is little pressure on the carbons and great resistance, very little current flows through at this point. Additional movement of the handle increases the pressure on the carbons by an electric device until the desired pressure with the carbons is obtained to give the current resistance and the amount of current necessary to operate the cylinder.

Test of Oil-Treated Chrome-Vanadium Rolled-Steel Wheels

The Grand Trunk Railway has three lots of tenders, of twenty-five each, equipped respectively with unheat-treated carbon steel tired wheels, oil-treated carbon rolled steel wheels, and oil-treated chrome-vanadium rolled steel wheels, the last two types having been made by the Standard Steel Works Company. Of these three lots of tenders, that equipped with steel-tired wheels went into service between the latter part of January and the first part of March, 1913; that equipped with oil-treated carbon rolled steel wheels in August and September of last year; and that equipped with oil-treated vanadium rolled-steel wheels in November. Comparison is possible because it is stated that though the steel-tired wheels were in service longer than the others, they saw little service during the winter of 1913 and the real test of their merits came last winter.

Careful records were kept by the railroad of the performance of the wheels, particularly as regarded the amount of shelling, as this is stated to be a common defect on the Grand Trunk lines. From these it was found that only three pairs out of 100, or 3 per cent, of the oil-treated, chrome-vanadium, rolled-steel wheels had to be removed on account of shelling. Nine pairs, or 9 per cent, of the oil-treated, carbon, rolled-steel wheels and seventeen pairs, or 17 per cent, of the steel-tired wheels were removed for this cause. In other words, the oil-treated carbon-steel wheels shelled three times as much and the steel-tired wheels five and one-half times as much as the oil-treated, vanadium, rolled-steel wheels.

Further comparison showed that of the oil-treated vanadium wheels only 8 per cent had to be removed from all causes, such as sharp flanges. Of the oil-treated carbon steel wheels 22 per cent, and of the steel-tired wheels 52 per cent had to be removed; in the latter case, the larger number of removals was attributed to their longer service. As regards shelling, however, this circumstance did not affect the comparison with the other two makes. All the cases of shelled steel-tired wheels occurred during the past winter, while none shelled during the short period in which they were in service during the winter months of 1913.

As regards wearing qualities, the oil-treated, chrome-vanadium, rolled-steel wheels showed 68 per cent more mileage per unit of wear than the oil-treated, carbon, rolled-steel wheels. The former averaged 14,500 miles per 1/32-in. tread wear, not including turning, as compared with 8600 miles, the record of the latter. Fair comparison as to mileage and wear without turning with the steel-tired wheels was impossible, owing to the greater length of service of the latter.

Physical and chemical tests of the oil-treated vanadium steel wheels showed a drop-test strength of one specimen wheel in a horizontal position of 1,254,000 ft.-lb. before cranking. The elastic limit ranged between 80,500 lb. and 103,200 lb., depending on location

of the test piece in the rim and the elongation ranged between 10 per cent and 18 per cent. Hardness tests showed a practically uniform hardness of 302 Brinnell, and 48 scleroscope throughout the entire section, though a slightly higher degree of hardness was detected in the plate by the scleroscope. The chemical analysis showed carbon, 0.654 per cent; manganese, 0.63 per cent; chromium, 0.992 per cent; silicon, 0.30 per cent; vanadium, 0.16 per cent; phosphorus, 0.039 per cent, and sulphur, 0.047 per cent.

Automatic Flagmen on Long Island Railroad

The Long Island Railroad, New York, has recently installed for the protection of two grade crossings the automatic flagmen made by the L. S. Brach Supply Company, New York. The indication consists of the combination of a bright swinging red light imitating that of a man swinging a red lantern and a loud sounding bell of the locomotive type. At Lynbrook, where two of these signals are located, the control is from track contacts, the installation being on the electrified division of the Long Beach branch. The energy for operation and control is taken from the railway's signal service feeder at 2200 volts a.c., and is reduced by transformer to 110 volts, at which potential the signals are operated. The two crossings protected are about 400 ft. apart.

Five track contacts are employed in each direction to start and stop the signal, three of them being starting contacts and two stopping, one at each crossing. The contact arrangement is such that if a train stops within the signal limits the bell will ring only for approximately thirty seconds to a minute. The signal starts as soon as the train is again in motion toward the crossing,

TWO LONG ISLAND CROSSINGS WITH AUTOMATIC FLAGMEN

and automatically cuts out as the train passes over the crossings. To secure this function, a relay and time element device are employed. These permit a train to come to a stop at a local station within the signal zone and stay there for a period of time without incurring the annoyance of continuous bell or signal operation. Hence the signal indicates only conditions of actual danger.

The swinging red light effect is reproduced by eight stationary lamps located between red lenses, facing both sides of the highway. These lamps are in arc relation and are lighted successively backward and forward from a contact device. The effect of this backward and forward lighting gives the same effect as that of swinging a red lantern, a commonly understood

TRACK CONTACT

danger warning. By means of concentrating lenses and shadow hoods, the lights are plainly visible in daytime from 1000 ft. to 1500 ft. from the signal under strong sunlight. This visible indication is more powerful and effective than an audible one, although the locomotive type of bell used has greater sound-carrying power than the vibrating type commonly employed.

Both the bell hammer and the contacts for the lamps are operated from an electric motor in order to avoid the heavy arcing of make-and-break contacts. No movable parts of the signal are exposed. The circuit wiring is such that should any lamp or several lamps go out, the indication will not be affected, because the light would be given by the other good lamps and the indication will skip only the burned-out lamps in its operation. The track circuit wiring is on the "normal danger" plan, so that should a line wire break a continuous danger indication will be given until it has been repaired. At the ends of the signal are two white lenses which indicate the operation to the train motor

SIGNAL MECHANISM WITH MOTOR

man. Should the signal fail it can be reported at the end of the trip and prompt repairs made.

Similar installations of this signal have been in use for some time on the Public Service Railway of New Jersey, the Scranton & Binghamton Railroad and on several steam railroads, including the Central Railroad of New Jersey, Delaware, Lackawanna & Western and the Boston & Maine.

Heavy Service Trucks

The accompanying illustrations show two designs of electric motor trucks, recently built by the Baldwin Locomotive Works for heavy, high-speed service. The truck for the Ohio Electric Railway, designated by the

TRUCK FOR MAXIMUM SPEED OF 50 M.P.H.

builders as Class AA, is used in interurban passenger service requiring maximum speeds of 50 m.p.h. The track gage is standard, and the sharpest curves are of 45 ft. radius. This truck has a wheelbase of 84 in.; the wheels are of solid rolled steel 36 in. in diameter, mounted on steel axles having 5-in. x 9-in. journals. The transom gussets are of cast steel; they brace the frame and serve as supports for the brakeshoe hangers,

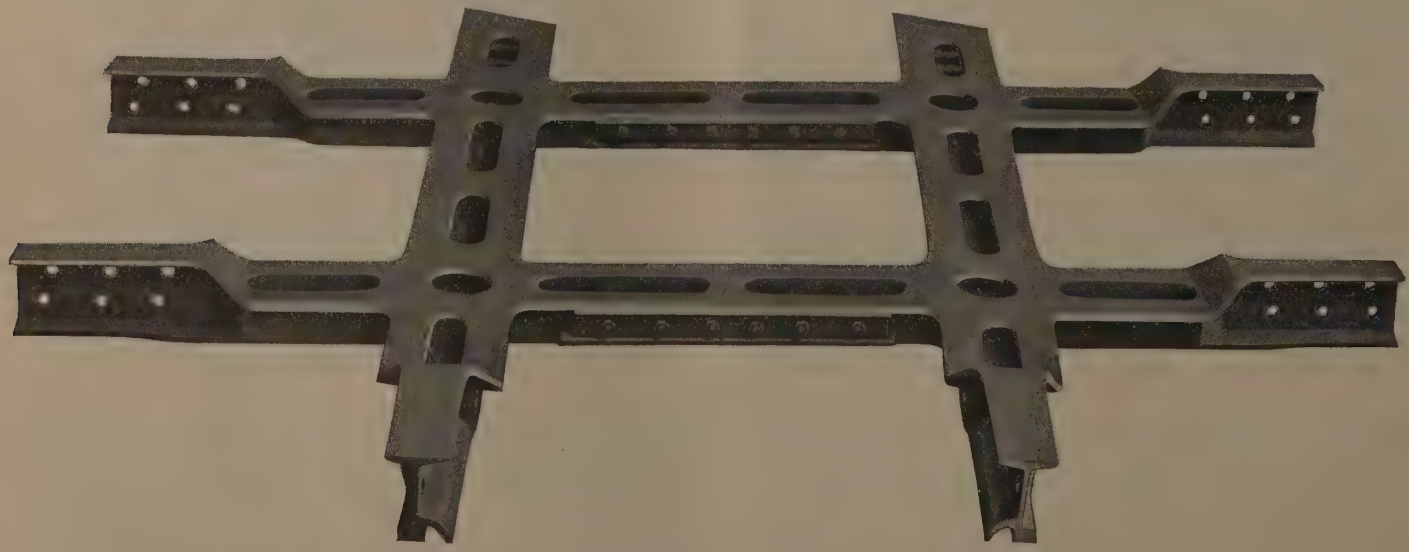
TRUCK FOR MAXIMUM SPEED OF 80 M.P.H.

and also transmit the greater part of the thrust from the side frames to the bolster when the motors are developing power. The chafing plates on the bolster are case hardened, while those on the gussets are of soft steel. The springs are arranged to insure easy riding qualities, the equalizing beam springs being of the twin coil pattern, while the bolster springs are full triple elliptic. The carrying capacity of this truck is 32,000 lb. on the center plate. The motors are inside hung, one being geared to each axle.

The truck for the Michigan Railway Engineering Company is specially designed for high-speed service on the new air line shortly to be opened between Kalamazoo and Grand Rapids. The schedule requires an average speed of 50 m.p.h., so that the operating conditions, in this respect, are unusually severe. The track gage is standard, and the trucks are designed to traverse curves of 35 ft. radius. The wheels are of solid rolled steel, 37 in. in diameter, and the axles are of heat-treated steel, with 5½-in. x 10-in. journals. The bolster is a steel casting, equipped with the Bullock swing dampener, a device intended to check the free longitudinal swinging of the bolster in the frame of the truck. The bolster has a central rib, and has openings at each side near each end. A shoe is mounted in each opening and a coiled spring is placed between the central rib and the shoe, so that the latter is forced out against the chafing plate carried by the transom gusset. The shoes are of cast iron with chilled faces, while the gusset chafing plates are of mild steel. The truck frame is unusually strong, and is built as far as possible of commercial shapes so that repairs can be easily effected. The equalizing beam springs are of the double helical type, while the bolster springs are quadruple elliptic. This truck is designed for a center pin load of 50,000 lb., and as far as speed and carrying capacity are concerned it is undoubtedly one of the most notable thus far built for electric railway service.

A New Steam-Electric Crossing

The accompanying illustration shows the latest type of steam-electric crossing made by the St. Louis Steel Foundry Company in accordance with patents which were granted to this company early in July. In the past there have been many failures of solid manganese steel crossings caused by cracks in the bottom of the flangeways at the intersection. While some of these cracks resulted from poor foundry practice, a large part were due to the fact that the crossing was not designed with the proper beam strength across the intersection, some manufacturers leaving out all of the lower cross members in the crossing. These lower cross members are alternately subjected to tension and compression, owing to the movement of the train over the crossing. Without the addition of these bottom members, as here shown, the metal under the flangeway had to carry all this strain. As this metal was only about 1 in. thick and was practically lacking in the neutral motion of the beam, early rupture was sure to occur. The manufacturer of the present crossing believes that with the addition of these lower beam members to tie the crossing together, the entire crossing is made just as strong at the running surface. It is stated that this construction has been in service for about a year, and that it has proved to be very satisfactory.



STEAM-ELECTRIC CROSSING OVERTURNED TO SHOW LOWER CROSS MEMBERS

News of Electric Railways

Bill to Prevent Further Enforcement of Toledo Three-Cent Ordinance

A supplementary bill was filed in the United States District Court on Aug. 7 by the Toledo Railways & Light Company, Toledo, Ohio, asking that the city of Toledo be enjoined from the further enforcement of the Schreiber 3-cent-fare ordinance and that it be restrained from interfering with the withdrawal of cars from the streets on which franchises have already expired and the company be permitted to start them in such places as it may see fit. As Judge Killits is absent on a vacation, it is possible that Judge Clark, Cleveland, recently appointed to succeed Judge Day, will be asked to hear arguments on the supplementary bill. The original bill filed in the Federal Court asked for a receiver for the company, but the court has never been requested to fix a date for a hearing on this request. It has stood as a protection to the company in case any untoward steps were taken by the city.

It is probable that several weeks will elapse before steps are taken by the city in accord with the provisions of the municipal ownership ordinance which was passed by a vote of the electors recently. City Solicitor Thurstin said that the franchise committee should be present when this matter is taken up, in order that the members may take part in formulating plans, but two of the members will be out of the city for some time. Frank L. Mulholland of the Citizens' Franchise Association stated that nothing further can be done by the organization until the city solicitor's department indicates its course. The general understanding is that the city must enact some definite franchise ordinance as a security for the bonds that will be issued to take over the present street railway property or construct new property. The City Council must also take the usual action in providing for the issue of the $8,000,000 of bonds called for by the initiated ordinance. This bond question will then have to be submitted to a referendum vote. The voters apparently took only slight interest in the original ordinance, but when the bond issue comes before them it is expected that practically the full vote will be cast.

Regarding the possibility of disposing of the street railway bonds, various views are taken, but the following extract from a letter from C. E. Denison & Company, Boston, brokers, indicates how one previous bidder for Toledo securities views the proposal passed at the recent election:

"Is it true, as some of our Eastern financial papers write, that your city is proposing to go into the street railway business? We should like to know about this, as we have been recent bidders on your bonds, and in one instance the purchaser of a good sized amount. If you are going into the street railway business we shall probably discontinue bidding on Toledo bonds, as we do not believe in municipal ownership of street railways for United States cities, and we think that the city of San Francisco and the city of Seattle have seriously hurt their credit by going into the street railway business."

This letter was addressed to City Auditor McDonnall, who replied that he felt sure any Toledo bonds held by Denison & Company could be disposed of by his office.

There is still a great degree of uncertainty among those interested at Toledo as to whether a mere majority or a two-thirds vote is necessary in an election such as was held recently. City Solicitor Thurstin himself does not seem certain on this point. At best, he said, a long period will be required in which to take over the property from the present owner.

The following editorial from the Cleveland *Plain Dealer* is interesting in the light of the experience that Cleveland has had in the readjustment of the street railway business:

"Unfortunately for Toledo the approval by the voters on Tuesday of the ordinance providing for municipal ownership will not end the street car war in that city. The fight will be continued with increased bitterness, it is announced. Not only is there a strong element opposed to municipal ownership, but the construction of the ordinance is declared faulty. Claims made by attorneys, whose opinions are entitled to attention, are that the provisions of the ordinance are contradictory and its real meaning obscured.

"It is unfortunate that clearness did not mark the provisions of the ordinance when the city was making so serious an effort to put a troublesome problem out of the way. It is possible to write that sort of an ordinance so misunderstandings are reduced to the minimum. To make clear and definite the language is one step in reaching a solution. It is the foundation on which settlement must rest.

"Much constructive talent in Toledo appears to be arrayed against the settlement on the line of municipal ownership. It is a handicap when such a condition exists. Cleveland found a solution sufficiently troublesome and perplexing even when a great portion of the constructive talent of the city was aiding. A proposition for settlement along the lines of the Cleveland Tayler grant was rejected in Toledo. One wonders if it might have been successful had there been a figure and personality like Judge Tayler to take the leadership.

"Violent opposition to municipal ownership, with a large element of the business interests against the plan, and with legal questions already raised, may serve to hinder and delay the introduction of the policy and will make its adoption and operation exceedingly difficult. With each succeeding contest in other cities where settlement is sought, the far reaching importance of the Tayler plan in Cleveland is shown, and the sound judgment exercised in its adoption is emphasized."

Hearing on Washington Utilities

The committee on the District of Columbia of the House of Representatives held a hearing on Aug. 6 on a bill which directs the separation of the Washington Railway & Electric Company and the Potomac Electric Power Company, Washington, D. C. Those who appeared before the committee were Clarence P. King, president of the Washington Railway & Electric Company; W. F. Ham, vice-president; Capt. Charles Holm, New York, counsel for the company; Paul M. Lincoln, Pittsburgh, and A. K. Baylor, General Electric Company, New York. The Washington Railway & Electric Company owns a controlling interest in the Potomac Electric Power Company.

The principal feature of the hearing was the unexpected proposition advanced by Representative Prouty of Iowa, a member of the committee, that the two companies, instead of being forced by an act of Congress to separate, might be allowed to consolidate. The street railway officials, including Mr. King and Mr. Ham, said that in their opinion such an arrangement would be agreeable to the companies. Mr. Ham, in his statement to the committee, opposed the contention of the Public Utilities Commission of Washington that the Washington Railway & Electric Company has not maintained a proper depreciation account. Mr. Ham said in part: "The facts are that our annual report for the year ending June 30, 1912, to the Interstate Commerce Commission, shows a charge for depreciation of equipment amounting to $93,934. Furthermore, there appeared as a reserve in the report the sum of $550,251, which included a depreciation reserve of $516,290." He presented figures from an auditing company, which said that the railway company is making ample charges for maintenance and a proper provision for depreciation.

The railway officials protested against the separation of the two companies. Representative Prouty's suggestion altered the course of the inquiry, and it is stated that further hearings are likely to be held, with that suggestion in view.

In a letter sent to the company on Oct. 15, 1913, the utilities commission declared that dividends should not be declared without "the creation and maintenance of a sound depreciation account." Mr. Ham informed the committee that since 1902 the dividends paid by the company have averaged only 2.8 per cent. They have been larger of recent years. Mr. Ham questioned the expert knowledge of the commission to prescribe what should be a proper depreciation account for a railway company.

Referring specifically to Representative Prouty's suggestion of a consolidation of the two companies, Mr. Ham expressed the opinion that the time is not far distant when the advantages will be realized of consolidating all the railway companies and the power companies of the District of Columbia. He said this would settle "the transfer problem" once and for all, and would give the companies a sound financial basis, with the prospect of going forward to meet the demands of future growth in the Capital.

A recent attempt to consolidate the railway companies and the power company failed because of public opinion, led by the commissioners of the District of Columbia.

New York Rapid Transit Work to Continue Uninterruptedly

In view of inquiries with respect to the continuation of rapid transit work on account of the present financial situation in this country, Chairman Edward E. McCall of the Public Service Commission for the First District during the week made the following statement:

"The commission will continue to rush the completion of the dual system with all expedition. With so many parts of the system nearing completion or under contract, it is vital that the remaining portions should be constructed at the earliest moment. For example, it is essential that not a moment's time shall be lost on such connections as the Grand Central diagonal station, William Street, Nassau Street and Willoughby Street, Brooklyn. There are now engaged on our work upwards of 11,000 men. I am assured that we will suffer no inconvenience on account of lack of labor. The statements of the financial officers of the city show that while care need be exercised, the rapid transit work may continue to completion. The present crisis shows the wisdom of the dual contracts in so far as complete arrangements were entered into at that time with respect to financial matters."

During the week ended Aug. 8 the commission announced that at its meeting on Aug. 21 it will order advertising for bids for the construction of routes Nos. 43 and 26, the diagonal station at Forty-second Street, connecting the Lexington Avenue subway with the existing subway at the Grand Central Station, bids to be opened Sept. 11, 1914. This is one of the most important contracts yet to be let under the dual system agreements. The contract has now been sent to the Interborough Rapid Transit Company, the operating company, for its criticisms and suggestions, and will be returned by that company within a few days, when it will be put in permanent form by the commission. All contractors submitting bids for this work will be required to deposit a certified check of $75,000 with their bids. The successful contractor will be required to give a bond to the city in the sum of $500,000, and make a deposit, either in cash or securities, of $250,000 to protect the Interborough company. In addition a percentage of all monthly payments will be withheld by the commission until the completion of the work. The entire work must be completed within twenty-eight months from the signing of the contract. The commission's engineers state that the construction of this connection will present many new engineering features, and that it will be one of the most difficult engineering problems in the dual system.

The city has just opened for service the new rapid transit station underneath the gigantic municipal building, in which the heads of most of the city departments and their staffs are located. The station is part of the Centre Street loop line operated by the Brooklyn Rapid Transit System, and is one of the most elaborate of its kind in the world.

The Kansas City Terminal Building Problem

The board of control of the street railway of Kansas City has taken over a part of the duties assigned to it under the new franchise to the Kansas City Railways, but as far as the operating of the system is concerned the company is still the Metropolitan Street Railway, working under the general direction of the federal court and the receivers. P. J. Kealy represents the company and Robert P. Woods represents the city on the board of control, which is also acting under the receivers.

One of the present duties of the board is the selection of a site for the interurban station to be built in accordance with franchise terms. The five interurban lines which will use the station have been unable to agree on a site. The board will hold a public meeting soon and will then make a recommendation to the City Council. The Council, however, may locate the station irrespective of such recommendation. Representatives of four of the five lines have mentioned their preferences for the district within which they wish the station located, and all urge that the site be near the shopping center so that transfers can be avoided.

The Missouri & Kansas Interurban Railway, or the Strang Line, and the Kansas City, Lawrence & Topeka, or the Hocker Line, favor some site between Sixth and Twelfth, Wyandotte and Oak Streets. The Strang Line has its city office at Seventh and Walnut Streets. The Kansas City, Clay County & St. Joseph Railway, which has a ticket office at Thirteenth and Walnut Streets, suggests some location between Eighth and Fifteenth, Oak and Baltimore Streets. The Leavenworth Line suggests one of three sites: (1) Fourteenth and Fifteenth, Main and Baltimore; (2) Thirteenth and Fourteenth, Grand and McGee; (3) Tenth and Wyandotte. The fifth railway, the Bonner Springs line, has not expressed a preference. The Strang, Hocker and Bonner Springs lines enter the business district from the south, the Leavenworth line from the west and the St. Joseph line from the north. In most cases the preferences are for sites that will take the cars through the business district.

Agreement Between New Haven and Federal Department of Justice

The department of justice of the United States and the directors of the New York, New Haven & Hartford Railroad again have reached an agreement on methods for segregating the properties which go to make up the system, and the civil action recently begun by Attorney-General McReynolds has been ended. Instead of standing an action in court the directors have decided to meet the attorney-general half way and return to practically the original arrangement between the government and the road in compliance with the Sherman law. It is said that the entire agreement will be embodied in a decree which will be accepted both by the government and by the railroad officials, and submitted to the United States District Court for approval and record. It is stated that the criminal prosecution of the directors of the company will not be affected by the settlement of the civil action.

At the close of a meeting on Aug. 11 President James H. Hustis, of the New Haven Company, said that an agreement with Mr. McReynolds had been ratified by the directors which was in full accord with the vote of stockholders on April 21, authorizing a settlement with the government. An exception to the first arrangement, he said, was in regard to the disposition of the Boston & Maine stock owned by the New Haven. Mr. Hustis has resigned as a director of the New Haven, as on Aug. 15 he became head of the Boston & Maine. Chairman Elliott has been elected president of the New Haven to succeed him. The resignation of John L. Billard as a director was accepted.

Providence Tunnel Opened

The Rhode Island Company, Providence, R. I., has opened the tunnel from North Main to Thayer Street and discontinued the counterweight system on College Hill. The saving in running time from Swan Point, Butler Avenue, Rumford and Phillipsdale is five minutes, and the Elmgrove Avenue residents gain three minutes over the old schedule. This is due to the elimination of the delays on College Street, the cars now running express from Thayer Street to North Main—a distance of 2165 ft. from portal to portal. Another departure is in sending the west-bound tunnel cars through Exchange Place instead of Market Square and Westminster Street. This adds thirty cars to the ninety-eight previously run during the thirty-five-minute period ending at 6.20 p. m. The time interval is less than seventeen seconds. As traffic increases it is thought that it will be necessary to divert some of the East Side cars through North Main Street to Market Square. This, however, is not contemplated at present, the disposition being to test the new routing thoroughly before taking up the question of relieving the pressure on the northerly tracks in Exchange Place. A third change is the removal of many cars from Westminster Street, the principal retail thoroughfare.

The Los Angeles & San Diego Beach Electrification

Alexander Gordon, of the California Railroad Commission, held hearings recently on a petition to allow an issue of $825,000 in bonds for electrifying the Los Angeles & San Diego Beach Railroad. Raymond B. Talbot, vice-president and general manager of the company, told of the financial affairs of the company and explained the amounts given in the petition as estimates to cover various parts of the work, purchasing of land and erection of new buildings. He said it has been planned to replace the present light rails and erect a power house, a carhouse and machine shop at Pacific Beach. The cost of improvements at Pacific Beach would be about $80,000. The substation at Arctic and Ash Streets, San Diego, will cost about $22,000. The total cost of new equipment will be about $131,000. Mr. Talbot explained that the company, if given permission to issue the bonds, would increase its service materially and fund the present floating debt. A new terminal building to cost about $4,000 will be erected in La Jolla and the company will purchase at least sixteen new passenger cars and seventeen passenger trailers at a cost of about $125,000. The total amount the company expects to expend is $723,198, divided as follows: plant investment, $371,612; new equipment, $131,000; refunding indebtedness, $180,585; interest first year, $40,000.

The Courts and the Toledo Election

The special bench of the Court of Appeals, to which the case against the election for municipal ownership in Toledo, Ohio, was taken after it had been decided in favor of the plaintiff in common pleas court, rendered its decision on July 30, sustaining the decision of the lower court. The question was decided on the grounds that the court did not have jurisdiction and that the petition did not state the cause of action, grounds contained in a demurrer filed by City Solicitor Thurstin in both courts. The decision did not take into account the merits of the case, nor was the efficiency of the proposed municipal ownership ordinance taken into consideration. Judge Winch raised the question twice during the hearing, but the defense contended that it could be taken up on appeal, if the case is carried to the Supreme Court. In making its decision, it is understood that the court did not consider this point at all.

As noted in the ELECTRIC RAILWAY JOURNAL of Aug. 8, page 272, the ordinance carried by a plurality of 1100 at the election on Aug. 4. It merely expresses the will of the people who voted and does not carry with it authority to issue bonds. Even now there is doubt as to whether a majority or a two-thirds vote was necessary and the matter may reach the Supreme Court.

Finding for Company in Springfield Arbitration

The arbitration board which has been considering the problem of discipline for improper handling of fares on the Springfield (Mass.) Street Railway has issued a report sustaining the officials of the company in their contention that upon existing evidence three conductors against whom charges had been brought should be discharged from the service. The board found that one other conductor, while somewhat careless and irresponsible in handling fares, should be reinstated without pay for time lost. The board consisted of Gleason L. Archer, dean of the Suffolk Law School, Boston; Henry E. Reynolds, assistant general manager of the Bay State Street Railway, Boston, and M. J. Hennessey of the Amalgamated Association. In a general survey of the situation, Messrs. Archer and Reynolds stated that C. V. Wood, vice-president of the company, acted in good faith and did not desire innocent men to be reported by the inspectors, and that Mr. Wood and R. W. Reynolds, general manager of the Springfield Street Railway, were fully justified on the evidence in discharging the men named. The evidence was presented by eight inspectors. The board found that the evidence had not been discredited. In a brief dissenting report, Mr. Hennessey contended that the evidence was insufficient to warrant the men being found guilty of misconduct, but recommended that the entire award be accepted by the union. This was unanimously done at a meeting subsequent to the announcement of the decision.

Illinois Traction System Issues Newspaper Supplement

The publicity department of the Illinois Traction System has issued a twenty-four page supplement to various daily and weekly newspapers in which it reviews the history of the company and notes the growth and development of the many utility properties controlled by the McKinley syndicate. The many cities and towns through which the lines of the Illinois Traction System and the Chicago, Ottawa & Peoria Railway pass are described and many illustrations are included. The St. Louis terminals and the St. Louis Electric Bridge Company receive much attention, while the new terminal stations and office buildings of the company at Champaign and Peoria are described and carefully illustrated. The freight and express and the sleeping car and parlor car services also receive attention, as do the Decatur shops and storehouses, the block signal system, the many parks and recreation centers and the holiday trips that can be taken on both the Illinois Traction System and the Chicago, Ottawa & Peoria lines. In fact, the supplement reviews the entire work of the company. The supplement was used as an insert in about sixty daily and weekly papers in Illinois on Aug. 6.

Franchise Surrendered for Indeterminate Permits

The Indiana & Michigan Electric Company has surrendered franchises from South Bend, Mishawaka, Elkhart and Town River to the Public Service Commission and will take indeterminate permits therefor. An order of the Indiana Public Service Commission, issued recently, allowed the company permission to issue $150,000 in capital stock to pay debts arising from extensions and betterments of service. The same order rescinded a previous order of the commission which authorized the company to issue $500,000 of bonds. The authorized capital of the company is $3,500,000, and approximately $3,300,000 had been issued before the order of the commission.

Campaign for Hydro-Electric Railways in Ontario

The first meeting in the campaign for hydro-electric radial railways in York and Ontario Counties in Canada was held in Agincourt on Aug. 5 with more than 500 persons present. Reeve J. G. Corbell, Scarboro, was in the chair. He explained that the object of the campaign was to educate the electorate as to the advantages of the proposed new hydro-electric radial railway from Toronto to Port Perry, in order that they could vote intelligently on the by-laws to be submitted by the various municipalities on Sept. 21 to guarantee the bonds for the new line. Sir Adam Beck said that the new road would open many new districts now without any means of transportation and give direct and speedy connection with the city. He expressed himself as confident that a right-of-way could be secured in Toronto giving direct access to the center of the city. He estimated the cost at about $40,000 per mile.

Memorandum by Massachusetts Commission Upon Reduced Rates for Charitable Purposes

The Massachusetts Public Service Commission has issued a memorandum defining the general limitation of free or reduced rate service by steam railroads and street railways for charitable objects. Under Sec. 18, Chap. 784, Acts of 1913, common carriers are prohibited from furnishing free transportation with various exceptions, among which are charitable purposes. The board gave a public hearing to the various companies upon the subject and has reached the conclusion that it would not be consistent with the public interest to permit common carriers to grant free or reduced rate service to any and all kinds of religious and educational institutions. The memorandum says:

"Rather should the operation of this exception to the general prohibition be limited to needy classes, such as the inmates of hospitals, of homes for the aged, of orphans' homes, day nurseries, mothers' outings and other similar undertakings supported by benevolent and charitable societies and intended for the relief of suffering or to furnish opportunities for health to needy children and women and others unable from their own resources to provide the requisite opportunities. Trips for school children, perhaps to visit the

State House, Sunday-school picnics, outings of athletic associations and clubs, and other similar purposes, which are mainly for pleasure and are not intended primarily to relieve any real suffering or need, are not, in the judgment of the commission, charitable purposes to which the carriers ought to contribute by granting free or reduced rate service not available to the general public."

Boston Men in Belligerent Zone

In the last issue of this paper mention was made of a number of electric railway men stranded in Europe. It has since been learned that the plans of several Boston men have been upset by the war. John W. Corning, electrical engineer of the Boston Elevated Railway, is in England. E. W. Holst, superintendent of equipment of the Bay State Street Railway, has returned from Norway. Eliot Wadsworth, of Stone & Webster, was on the *Kronprinzessin Cecilie*, which put back into Bar Harbor. C. S. Sergeant, vice-president of the Boston Elevated Railway, was planning to go abroad this Summer, but has been forced to abandon the idea. His family is now in England.

A special cable to the New York *World* said that the withdrawal of thousands of men from every field of labor has seriously altered transportation in Paris. The underground railway was said to be running only on certain lines, and then only on a much reduced service. The work of the conductors, ticket punchers and other employees called to the front is being done by their wives and sons.

Air Brake Order Asked in Windsor.—The City Council of Windsor, Ont., has applied to the Ontario Railway & Municipal Board for an order to compel the Sandwich, Windsor & Amherstburg Railway to install air brakes on its cars and to provide the necessary equipment for keeping the tracks clear of snow during the winter.

Automobile as Adjunct in Seattle.—If common user rights cannot be obtained soon on the tracks of the Seattle, Renton & Southern Railway on Fourth Avenue, Seattle, Wash., the City Council will consider the operation of a municipal motor bus service connecting Division "A" of the municipal electric railway with the Highland Park & Lake Burien Line, Division "C."

Interstate Commerce Commission Hearing Suspended.—The Interstate Commerce Commission is having at the present time as much of a recess as is possible, for no hearings are scheduled to require the presence of any commissioners during August. Secretary McGinty is visiting the valuation offices of the commission, his first itinerary calling for a trip as far as Kansas City and Chattanooga.

Part of Clover Leaf to Be Electrified.—It is announced that the Clover Leaf Railroad may construct an electric railway from Crawfordsville, Ind., to Cayuga, Ind., where connection will be made with the present tracks of the company, and that the motor car service which extends eastward from Marion, Ind., will be continued west to Cayuga and into Illinois, with the branch from Cayuga to Crawfordsville.

Municipal Ownership Agitation in Alexandria.—The City Commissioners of Alexandria, La., signified their intention of calling an election recently on the question of granting a franchise to the Southern Traction & Power Company on Sixteenth Street from Levin to Marye, and out Marye to the city limits, and on Magnolia and Thirteenth Streets. The advisability of the city endeavoring to take over the property of the company under the provisions of a bill passed recently by the Legislature is being agitated.

Illinois Traction Not to Buy "Black Bridge."—T. W. Gregory, assistant treasurer of the East St. Louis & Suburban Railway, East St. Louis, Ill., has denied that the Illinois Traction System has purchased the "Black Bridge" line of the former company which runs between the Stock Yard district in East St. Louis and Madison, Ill. The Illinois Traction System recently erected a new freight depot at the East St. Louis terminus of the Black Bridge line and is operating express cars to this depot instead of the one at Collinsville and St. Clair Avenues. The Illinois Traction System has trackage arrangements with the East St. Louis & Suburban Railway.

Wage Agreement in Ottawa.—As a result of conferences held recently between the officers of the Ottawa (Ont.) Electric Railway and representatives of the employees, the award of the board of conciliation made in June, 1912, is to be continued for two years from July 1, except that the first and second year men will receive an increase of 1¼ cents an hour and those in the third year of service and upwards a 2-cent increase. This makes the rates as follows: first year, 23 cents; second year, 24 cents; third year and thereafter, 27 cents. Sunday work will be paid for at 2 cents an hour extra over the rates just stated. Increases in wages have been granted in the company's other departments. The rules and conditions of work which have been in force for the last two years remain unchanged.

Through Trolley Trip, Boston to New York.—A trolley trip under the auspices of the Bay State Street Railway will be run between Boston and New York during the week commencing Aug. 16. A through car, said to be the first to cover the entire distance, will leave Post-office Square, Boston, with a party of street railway officials and newspaper men at 8 a. m. on Aug. 17, stopping at New London, Conn., for the night. The car is due at 123d Street, New York, at 6.45 p. m. Tuesday and the distance to be traversed is 282 miles. On Wednesday the return trip will be started with several New York newspaper men as guests. The through service is made possible by the recent completion of a connecting link between Saybrook and New Haven, Conn., and the run is planned to furnish data upon which tourist travel may later be founded.

New Jersey Ferry Fare Case.—The New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J., as owner of the stocks and bonds of the Riverside-Fort Lee Ferry Company, recently brought suit in the United States District Court against the ferry company, the city of New York and the Board of Chosen Freeholders of Bergen County, N. J., asking that the resolution passed by the freeholders, reducing the fares on the ferry from the foot of West 129th Street, New York, to Edgewater, N. J., from 5 cents to 3 cents for an adult and from 4 cents to 2 cents for children, be declared illegal. The complaint alleged that the reduction would cause a loss to the company of $100,000 annually. Judge Meyer granted an injunction temporarily authorizing the company to continue to collect not less than 5 cents for an adult and 4 cents for a child.

Legislative Expense of the Boston Elevated Railway.—The Boston Elevated Railway has issued the following statement in connection with the filing of its legislative expenses: "The Boston Elevated Railway was interested in upwards of 300 matters acted upon by the Legislature of 1914. The company was not a petitioner for any legislation this year and was represented by counsel and officers of the company only on matters originating on the petitions of others. On some of the matters there were many hearings, the company having been represented at as many as nine hearings upon each of several matters. The statement of legislative expenses for 1914 filed by the company with the secretary of the commonwealth, shows that $7,500 was paid to Gaston, Snow & Saltonstall, and $931.35 to E. P. Saltonstall for legal services, and $659.37 to Edgecomb & Neylan for stenographic reports.

Security Holdings of James Campbell Estate.—According to an inventory of the personal property of the late James Campbell recently filed for probate in St. Louis, Mo., the par value of the securities owned by Mr. Campbell amounts to $16,896,805. It is estimated that the market value of these stocks and bonds is $6,821,237, or $10,065,568 below the par value. The value of the real estate owned by Mr. Campbell is placed at $3,500,000, so that the value of his estate is slightly more than $10,000,000. The stocks in which Mr. Campbell was most heavily interested were 'Frisco common, first preferred and second preferred, Rock Island preferred and Missouri, Kansas & Texas common. In addition to these securities there were included in the list of sixty-eight companies whose securities were held by Mr. Campbell the following: Utah Securities Corporation, par value $4,184,000; St. Louis Transit Company, par value $2,100; North American Company, par value $3,294,500; United Railways Company of St. Louis, par value $118,100; Kirby Lumber Company, par value $90,400; Wagner Electric Company, par value $94,500; Midland Securities Company, par value $50,000, and American Light & Traction Company, par value $43,500.

Financial and Corporate

Holdings of Public Utility Securities

The closing of American stock exchanges has, in its broadest aspect, had no adverse effect on the market for public utilities securities. The prime reason for this is that only a relatively small number of such securities is listed. This, however, has never detracted from their marketability. The bulk of the public utility transactions are through investment houses that specialize in this class of bonds and stocks, selling large quantities of them "over the counter" to the investors. The records of purchases and sales, however, have not been published or even collated.

Certain exact statistics, however, indicate how investors have been turning from other classes of securities to those of public utilities. The report of the Comptroller of the Currency of the United States for the fiscal year ended June 30, 1913, which was referred to in the ELECTRIC RAILWAY JOURNAL at the time of its publication in the spring of this year, presents some illuminating figures concerning the bond holdings of the 26,000 banks of this country. In this fiscal year, as compared to the preceding, bank investments in United States bonds declined 0.2 per cent; in State, county and municipal bonds, 0.9 per cent, and in railroad bonds, 2.1 per cent. On the other hand, the banks' holdings of bonds of public utilities increased 2.1 per cent. The decrease in the banks' investments in steam railroad bonds was $101,400,000 in value, while the increase in public utility bonds held was $118,800,000 in value. This represented an increase of nearly 20 per cent in bank holdings of such bonds.

The largest banking holders of public utility securities are loan and trust companies, with holdings of $334,300,000. National banks come next with $197,400,000; mutual saving banks have about half as much, and state banks hold $52,900,000, or a total of $721,400,000. If United States, state, county and municipal bonds, which form a necessary part of the investments of national and savings banks, are eliminated from the calculation, the holdings of public utility bonds become nearly 22 per cent of the remainder, or more than half as much as the percentage of railroad bonds. The latest available statistics show that the total value of railroad securities in the United States is a little more than $20,000,000,000, while the aggregate value of the operating gas, electric light and traction companies' securities is about $7,500,000,000. From the above statistics it appears that less than one-tenth of the public utility securities are held by the banks, and that the other nine-tenths are in the hands of companies and individuals.

The present popularity of public utility securities bids well to be enhanced during the European war period. Gas and electric consumption and electric railway transportation will continue, which means larger earnings, increased profits and greater stability for the corporations. The general attitude among investment houses regarding the present status of public security issues is shown by the following quotation from the weekly review of Williams, Dunbar & Coleman, New York: "Peculiarly exempt from the various adverse influences now on the financial horizon are public utility securities. Irrespective of the depression in the railroad or industrial stocks and bonds, American public service securities will not be affected. There may be some sentimental reaction in prices, but the attraction for permanent investment will not be impaired."

In accordance with the plan of the Cities Service Company, New York, as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 8, to issue a weekly letter to stockholders informing them of the trend of events following the recent deferring of the company's cash dividend, the directors on Aug. 10 issued a statement reading in part as follows: "Many of our stockholders who were not in close touch with the financial condition at the time of the dividend postponement are only now awakening to the severity of the disturbance and may be led to believe that the situation is growing worse instead of better. We believe, however, that the situation is improving daily, and much credit is due to the administration for its prompt supply of emergency currency. Our managers generally report that business continues to be good, but that some difficulty is being experienced in making collections from large customers."

ANNUAL REPORTS

Montreal Tramways

The statement of income, profit and loss of the Montreal (Que.) Tramways for the fiscal year ended June 30, 1914, follows:

Gross earnings	$7,142,804
Operating expenses	4,206,115
Net earnings	$2,936,689
Deduct:	
City percentage on earnings	$527,383
Interest on bonds and loans	787,769
Interest on debenture stock	800,000
Taxes	84,700
Total	$2,199,852
Net income	$736,837
Dividends	242,056
Surplus	$494,781
Less:	
Balance of discount on bonds sold	$82,237
Transferred to contingent renewal account	275,000
Total	$357,237
Transferred to general surplus	$137,544

The gross earnings of the company increased during the year $388,577, or 5.75 per cent; the operating expenses, $173,450, or 4.3 per cent, and the net earnings $215,127, or 7.9 per cent. The ratio of operating expenses to earnings was 58.89 per cent, as compared to 59.71 per cent during the preceding year.

During the year the sum of $417,125 was charged to the contingent renewal account as representing expenditures made for special renewals. An amount of $289,706 was expended on the maintenance of the company's properties, plant and equipment. This amount, taken with the $417,125 noted above, made a total of $1,246,831, or 17.46 per cent of the gross earnings, expended during the year on the upkeep of the company's properties. There was spent on capital account for additional rolling stock, extensions and improvements the sum of $2,711,572. Underlying bonds of the company to the amount of $313,893 were redeemed and cancelled. The amount of the underlying bonds redeemed to date is $838,607.

The report states that large additions were made to the rolling stock of the company during the year, which necessitated extensions of the power requirements. The company also completed a large portion of the rebuilding of its track. The number of revenue passengers carried during the year amounted to 168,472,952. The total number of transfers was 58,120,066, making the number of total passengers carried 226,593,018. The car earnings per revenue passenger were 4.11 cents and the car earnings per passenger total carried, 3.05 cents.

Alabama Traction, Light & Power Company, Ltd.

The Alabama Traction, Light & Power Company, Ltd., New York, which controls the Anniston Electric & Gas Company, Anniston, Ala., the Huntsville Railway, Light & Power Company, Huntsville, Ala., and the Horne Alabama Railway, Power & Manufacturing Company, has issued its first annual report covering the entire period from the organization of the company to Dec. 31, 1913. According to the consolidated balance sheet presented in the report, the property assets of the company as of Dec. 31, 1913, amounted to $27,109,864; investments in other companies, $962,519; bond discount and expenses, $1,783,322, and current and working assets, $463,019, making with a few other small miscellaneous items a total of $30,429,269. Capital liabilities of the company included the following: preferred stock outstanding, $1,000,000; common stock outstanding, $16,975,000, and first mortgage bonds outstanding, $10,902,000. The bonded indebtedness of subsidiary companies not owned by the Alabama Traction, Light & Power Company, Ltd., amounted to $327,800. The current and accrued liabilities totaled $1,129,896; the reserve for accidents and damages, $913, and the surplus, $93,133.

The activities of the company during the period covered by the report were directed principally to construction work on the hydroelectric plant of Lock No. 12 on the Coosa River. A steam plant with a capacity of 15,000 hp was built at Gadsden. It has been operated in conjunction with the com-

pany's 2000-hp hydroelectric plant at Jackson Shoals. At present the company has in operation 160 miles of 110,000-volt transmission lines, delivering current through three substations to a distributing system 116 miles in length.

The report does not present any income statement for the holding company or for any of the subsidiaries. It is stated, however, that the earnings at present assured are sufficient to carry the fixed charges on the entire system, including the burden of certain unproductive investments which the company feels it necessary to purchase in order to be in a position adequately to meet future requirements.

Chicago & Interurban Traction Company, Chicago, Ill.—Owing to a misprint, the revenue from transportation of the Chicago & Interurban Traction Company for the year ended Feb. 28 was stated in the ELECTRIC RAILWAY JOURNAL of Aug. 8 as being $209,811 instead of $290,811.

Monterey Railway, Light & Power Company, Monterey, Mexico.—Directors of the Monterey Railway, Light & Power Company have announced that owing to the continuance of the unsettled conditions in Mexico which led to the delay in the payment of the interest on the first mortgage debenture stock due Feb. 1, as noted in the ELECTRIC RAILWAY JOURNAL of March 21, they are compelled to postpone the payment of interest on the first mortgage debenture stock due on Aug. 2, until it is possible to transfer the money on more reasonable terms.

New York, New Haven & Hartford Railroad, New Haven, Conn.—On July 31 the resignation of John L. Billard as a director of the New York, New Haven & Hartford Railroad was announced. This leaves twenty-two directors in the board. As it is desired to reduce the number to nineteen or less, no successor will be elected.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The California Railroad Commission has authorized the Oakland, Antioch & Eastern Railway to issue $900,000 of three-year promissory notes, bearing interest at the rate of 6 per cent per annum and redeemable at the option of the railway on any interest date at face value and accrued interest on not less than thirty days' notice. The application for these notes was mentioned in the ELECTRIC RAILWAY JOURNAL of Aug. 1. The company is further authorized to issue $330,000 face value of first mortgage 5 per cent bonds and pledge these bonds, together with others heretofore authorized by the commission, as security for the payment of the notes at the ratio of two to one. The notes will be convertible at the holder's option before maturity on the basis of 80 per cent of the par value of the bonds with accrued interest for the par value of the notes with accrued interest. The notes must be sold for not less than 96, provided, however, that the company may pay a commission for their sale of not to exceed 4 per cent. The company will be required to make up by stock assessment during the next three years the discount at which the notes are sold below par. The proceeds are to be used only to pay off floating indebtedness.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company is offering the unsubscribed balance of its first preferred stock, amounting to $12,500,000, to the public and is urging its customers to take the new stock. In view of requests from several stockholders the company decided to issue a special circular to its customers dealing with the merits of the stock issue. While the price of the stock to the customers is the same as to the general public, the company points out the advantages to the customers being stockholders in the company supplying them with service. Previous references to this preferred stock financing of the company were made in the ELECTRIC RAILWAY JOURNAL of July 11 and July 25.

The Consolidated Railways, Light & Power Company, Wilmington, N. C.—The Consolidated Railways, Light & Power Company has presented a petition to the City Council for a franchise to change its existing lines. This company is the lessor of the Tidewater Power Company, which recently opposed the granting of a franchise to the Wilmington & Carolina Beach Railway. The City Council on July 29 granted this latter company the right to build and operate an electric road, and adopted a resolution calling for a special election on Oct. 7 to ratify or reject this grant. The proposed city lines of the new company will be about 11 miles in length, and the suburban lines from the city to Wilmington Beach and Carolina Beach will be more than 13 miles. The estimated cost of the lines and the power plant is $750,000.

Toronto (Ont.) Railway.—Seventy-one 4½ per cent currency bonds of $100 each and 322 sterling bonds of £100 of the Toronto Railway, issued under the first mortgage dated Sept. 1, 1892, have been drawn for redemption at par and interest on Aug. 31. Payment will be made at the Canadian Bank of Commerce, Toronto.

United Railroads of San Francisco, San Francisco, Cal.—The California Railroad Commission on July 30 issued a supplementary order authorizing the United Railroads of San Francisco to issue $378,000 of car trust certificates. The original order, which was noted in the ELECTRIC RAILWAY JOURNAL of June 6, provided that the certificates might be paid off in ten years, but the new order enables the railway to pay them off in a shorter time if so desired.

Warren, Brookfield & Spencer Street Railway, Brookfield, Mass.—The foreclosure sale of the Warren, Brookfield & Spencer Street Railway which, as noted in the ELECTRIC RAILWAY JOURNAL of July 25, was set for Aug. 6, has again been adjourned to Sept. 10 on account of the absence of bidders.

Dividends Declared

Central Arkansas Railway & Light Corporation, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Connecticut Valley Street Railway, Greenfield, Mass., three-quarters of 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '14	$71,595	*$41,215	$30,380	$17,567	$12,813
1 " " '13	60,780	*28,913	31,867	17,198	14,669
12 " " '14	782,952	*365,001	417,591	208,791	209,160
12 " " '13	735,690	*334,820	400,870	204,868	196,002

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., June, '14	$91,477	*$58,834	$33,043	$28,190	$4,853
1 " " '13	101,635	*60,466	41,169	23,204	17,965
12 " " '14	1,162,036	*707,128	454,908	320,791	134,117
12 " " '13	1,161,121	*694,249	466,872	281,103	185,769

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO.

1m., June, '14	$249,684	*$169,951	$79,733	$42,362	$37,371

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m., June, '14	$217,868	*$119,646	$98,222	$63,599	$34,623
1 " " '13	200,339	*108,044	92,295	57,979	34,316
12 " " '14	2,447,406	*1,409,955	1,037,451	753,305	284,146
12 " " '13	2,213,749	*1,225,551	988,198	675,299	312,899

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., June, '14	$225,180	*$140,968	$84,212	$55,435	$28,777
1 " " '13	207,251	*128,060	79,191	48,037	31,154
12 " " '14	2,732,541	*1,707,886	1,024,655	619,123	405,532
12 " " '13	2,572,598	*1,434,535	1,138,063	584,432	553,631

GRAND RAPIDS (MICH.) RAILWAY

1m., June, '14	$109,413	*$70,651	$38,762	$13,361	$25,401
1 " " '13	112,045	*64,856	47,189	15,308	31,881
12 " " '14	1,297,010	*837,793	459,217	157,880	301,337
12 " " '13	1,270,291	*739,127	531,164	177,441	353,723

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO.

1m., June, '14	$127,203	*$76,702	$50,501	$35,470	$15,031
1 " " '13	129,354	*75,863	53,491	35,315	18,176
6 " " '14	658,106	*431,646	226,461	211,721	14,740
6 " " '13	633,699	*410,092	223,608	210,286	13,322

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m., June, '14	$62,002	*$40,257	$21,745	$15,579	$6,166
1 " " '13	63,459	*38,020	25,439	14,859	10,580
12 " " '14	677,723	*458,174	219,549	184,834	34,715
12 " " '13	650,004	*401,232	248,772	174,134	74,638

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., June, '14	$317,780	*$199,525	$118,255	$51,020	$67,235
1 " " '13	291,518	*178,355	113,163	45,214	67,949
12 " " '14	1,721,701	*1,059,635	662,066	301,835	360,231
12 " " '13	1,497,238	*928,458	568,779	270,723	298,056

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., June, '14	$248,874	$150,011	$98,863	$57,575	$41,288
1 " " '13	248,793	155,340	93,454	58,387	35,067
12 " " '14	3,093,848	1,883,165	1,210,682	704,458	506,224
12 " " '13	2,844,333	1,757,594	1,086,739	632,501	454,238

*Includes taxes.

Traffic and Transportation

Fare Order of Pennsylvania Commission

In the case of the complaint for a rate of fare over the Lehigh Valley Transit Company's line from Coopersburg to Allentown, Pa., lower than the rate now in effect, the Public Service Commission of Pennsylvania has ordered that the number and extent of the fare zones between Coopersburg and Allentown remain the same as heretofore; that the single return ticket for 25 cents issued at the office of the company at Coopersburg and Allentown continue in effect in the same manner and form as heretofore; that a commutation ticket book containing twenty-five round-trip tickets, good for the calendar month for which it is purchased, be issued as follows: (a) Good between Coopersburg and Allentown, with full transfer privileges in Allentown, for $4.50, thus making it at the rate of 18 cents a round trip. (b) Good between Centre Valley and Allentown, with full transfer privileges in Allentown, for $3.75, being at the rate of 15 cents a round trip.

Coopersburg is a small town located 9 miles from Allentown on the line of the Lehigh Valley Transit Company that extends from the latter place to Philadelphia. The regular rate of fare from Coopersburg to Allentown is 15 cents, but a return ticket can be purchased at the office of the company at Coopersburg or Allentown for 25 cents, thus making the fare each way 12½ cents, or a trifle less than 1.4 cents per mile. These return tickets have no time limit specified on them. The purchaser has the privilege, if he chooses to take advantage of it, of buying one or any number of these tickets at any given time, and is not obliged to call daily at the ticket office to pay his fare for transportation. Moreover, the ticket may be bought by one party and used by another, the ticket being accepted by the carrier from anyone that presents it. The regular one-way fare of 15 cents which must be paid on the car, and the daily return ticket which can be obtained only at the company's office at either end of the trip, are the only rates of fare established by the company between Coopersburg and Allentown.

The commission in its opinion says:

"The complainant avers that respondent issues a monthly commutation fare from other points on its lines about the same distance from Allentown at a much lower rate, and therefore contends that he is discriminated against, and petitions that he be granted the lower commutation rate accorded to the citizens of the aforesaid towns and places located on other divisions of the company's system. While respondent admitted that there are certain towns and places on other branches of its system, located about the same distance from Allentown as Coopersburg that have a lower rate of fare, it also established the fact in the testimony offered that there are other towns and localities on the Coopersburg line situated about the same distance from Philadelphia, Norristown and other centers of population as Coopersburg is from Allentown that have a higher rate of fare than the people of Coopersburg.

"From the various facts and administrative features educed at the hearing, it appeared quite conclusively that existing local conditions are always a factor which must be considered in the work of arranging a correct schedule of rates on the different lines of a transportation plant. The size of the cars operated on a line, the frequency of the service furnished, the density of the population of the adjacent territory, the grades and general alignment of the roadbed, the annual outlay required for repairs and upkeep on the different branch lines, all figure more or less in the rate problem, and must be considered up to a certain point in their proportionate bearing upon the matter.

"Since the hearing held in this proceeding, the company with a view of meeting the wishes of the complainant in part, and of maintaining thereby a spirit of harmony and co-operation with its patrons, has written to the commission that it is willing 'to issue commutation tickets for travel between Coopersburg and Allentown at the rate of 25 cents for a round trip, and between Centre Valley and Allentown at the rate of 16 cents for a round trip, such tickets, in each case, to be bound into books containing twenty-five round trips and to be good for use only on local cars and during the calendar months within which the same were issued, but only when presented by the purchasers in person, accompanied by the book themselves.'

"This proposed change in the rate of fare has been submitted to the complainant by the commission for comment. In his answer to the foregoing readjustment of rates, the complainant contends that the charge of discrimination preferred in the complaint is not removed and asks for a still further reduction in the rates. He requests that he be permitted to purchase for $2.70 'a monthly book containing twenty-five round-trip tickets with full transfer privileges in Allentown,' and for $3 'a book containing twenty-seven round-trip tickets with transfer privileges between Allentown and Coopersburg, good for at least one calendar month,' and that he be permitted to ride between Allentown and Centre Valley on either of two commutation books containing twenty-five and twenty-seven round-trip tickets respectively, which can be obtained at the rate of 10 cents for one round trip.

"It therefore appears that the proposed rates are not satisfactory to the complainant, and the company as intimated in its letter submitting the proposed reduction does not feel warranted to offer any further concessions in the matter. The commission accordingly has made a careful examination of the various local conditions affecting the point at issue, and also of the general principles that must be recognized in the problem of rate making when the transportation service of a general electric railway system is purely local on some lines and interurban and less frequent on other divisions."

After a full consideration of all the different phases and factors involved in the matter, the commission issued an order directing the fare changes previously noted.

Examination of Southern Indiana Employees

Examinations of all the employees of the Insull lines at New Albany in southern Indiana are conducted at regular intervals by James Harmon, safety agent of the company, in connection with the "safety first" work, in order to make sure that trainmen are familiar with the operating rules and other regulations. Ordinarily forty questions are prepared, numbered and typewritten on foolscap paper, with space between the questions for the answers of the men who are examined. A correct and sufficient answer is marked 2½ per cent, the total if the employee has made a perfect record, giving 100 per cent.

Practically all of the questions have a direct bearing on "safety first." A high rating in the examination tells in favor of advancement, while low ratings bring the men who made them into line for special coaching, suspension or dismissal. The sets of questions vary; ordinarily there are special sets for conductors, motormen and trackmen, for city employees and employees of the interurban lines, etc.

Among the examination papers recently turned in by the trainmen of the Louisville & Southern Indiana Traction Company and the employees of the street railway systems of New Albany and Jeffersonville, Ind., across the river from Louisville, was one by J. M. Sams, a motorman on the interurban line, who came through with a perfect score. Some of the questions and answers in Mr. Sams' paper are as follows:

Q—What forms of reading are allowed on duty?

A—Train orders, rule book and instructions, only.

Q—What is a station?

A—A place where trains stop to let off and take on passengers.

Q—What is a dwarf signal?

A—A low, fixed signal with a semaphore arm.

Q—What is a violent signal?

A—Any signal waved violently on or by the track.

Q—What should a motorman do when blowing the whistle is forbidden by law?

A—Ring his gong.

Q—What places should train approach under control?

A—All tongue switches, curves, crossings and special work.

Q—What should be done with a disorderly person?

A—Ask him first to behave himself and be quiet; then, if he will not behave, ask him to get off of car and if necessary put him off.

Q—Should switches be set for opposing train if you were to hold main track?

A—Yes, to save time; but when a switch has been opened for another train and is then left, the switch must be locked.

Q—What should be the speed of a car going over the switch points and frogs on the Big Four Bridge?

A—Four m. p. h.

T. P. Coleman, of the city service, was rated at ninety-seven. All of the answers on Mr. Coleman's paper were perfect except two. These were each marked off 1½ and were as follows:

Q—How should you pass cars at tongue switches?

A—If possible cars should not pass at tongue switches as a switch might split.

Q—How should motormen and conductors look out for passengers?

A—With all possible care.

Some of the other questions and answers from this same paper were as follows:

Q—When should bulletin boards be examined?

A—At all times.

Q—How can you popularize the service in your conduct towards the public?

A—By being polite to all.

Q—What should you do when there is evidence that your car is on fire?

A—Get the passengers off, pull down the trolley and try to put out the fire.

Q—When is conversation forbidden on duty?

A—At all times except when it is necessary to give information.

Q—How should conductors compel passengers to conduct themselves?

A—Like gentlemen or ladies.

Q—How should you report accidents to employees?

A—In no way at all.

Q—What do you use before ejecting a passenger?

A—Everything possible to keep from having to eject him must be done first.

Q—What should motormen and conductors do before assuming charge of their cars?

A—See that everything is as it should be.

A Motorman on Scientific Coasting

About three years ago W. M. Casey, now superintendent of transportation of the Denver (Col.) Tramway, contributed to the *Tramway Bulletin*, published by the company, an article dealing with the economical use of current. Mr. Casey intimated that he thought the motormen were using current until unnecessarily close to their stops. It seems now that a number of the motormen did not at that time agree with Mr. Casey in regard to the economies which he thought might be worked by stricter attention to the ideas he advanced. One of the motormen who disagreed with Mr. Casey in this matter has contributed to the July number of *Tramway Bulletin* his experience after having followed Mr. Casey's advice. The pertinent suggestions made by this motorman in regard to proper coasting methods follow:

"Scientific coasting does not consist solely in keeping the recording clock running the greatest number of minutes per trip, or hours per day, week or month. Scientific coasting is the art of coasting all of the time that you don't actually need to use current to propel your car. For example, A and B are operating cars—each is approaching a street crossing about one block distant; a car, having the right-of-way, is approaching from the opposite direction. A throws off his current and coasts until his car has crossed the street, and proceeds, not having been required to set his brake at all. B keeps current in his motors until near street crossing, makes a heavy application of air, and brings car to a full stop—being compelled, of course, to wait for go-ahead bells. A has saved the power required to propel his car for nearly a block, also the power necessary to replace the air used in making the stop, and the wear on the brakeshoes and wheels. He has also saved his conductor the time and trouble of turning his attention to the car stops and bell-cord.

"The same principle applies to all 'bell,' passenger and regular stops and slow-downs for curves, etc. Coast up to all vehicles or other obstructions on the track, whether moving or not—all current thus saved is clear gain. In my opinion, trying to make a coasting record on an upgrade, where no stop or slow-down is required, is poor economy, as the excess amount of current required to bring car back to speed will offset that saved while coasting.

"The best and most scientific coasting is done by making a good, long coast where a stop or slow speed is called for. The motorman nearly always hears the conductor's bell ring. Beat him to it. Get your current off, and save that much. It is only a little, but means a few ticks on the clock and a considerable saving when practiced on the entire system.

"Get a few ticks on the clock on every stop. I don't care how late or heavily loaded a car may be, it is not only possible but thoroughly practicable to get a few ticks on the clock at almost every stop. Keep your car on time. You lose more coasting getting out of the 'soup' than you do in keeping out. For economy of current get as long a coast as is practicable with the proper handling of a car every time a stop or slow-down is required. Current thus saved is clear gain.

"After all else is said, scientific coasting consists entirely in making an honest effort, being always on the job, and paying strict attention to the task at hand."

Transfer System in Newark

An effective plan of acquainting the public of changes in service rules in public utility operations is illustrated in the method adopted by the Public Service Railway, Newark, N. J., in making known its new general transfer system which went into effect on Aug. 1. Somewhat radical departures from former arrangements such as might easily lead to general confusion and differences among passengers not fully informed were evidenced in the change.

A day or two preceding the installation of the new system, and immediately thereafter, announcements were made in local dailies setting forth just what the various changes embodied. From one general color of transfer for each respective line a change was made to six standard colors, each relating to a particular direction of travel or second transfer, this latter being an added feature of the new system. Further arrangements for these transfers was also perfected in the establishment of zones. All these changes were carefully described in the company's announcement. On the day of the inauguration of the new transfer system only one complaint was registered. The transfer changes were made in connection with the general rerouting of the city lines of the company, as recently sanctioned by the Board of Public Utility Commissioners. The new transfers really extend such privileges, but eliminate the former possibilities of persons "looping" on a single fare. The company intends to continue during August its campaign of educating the public in the improved system along the lines noted.

Cincinnati Fare Case Will Be Appealed to United States Supreme Court

City Solicitor Schoenle of Cincinnati has filed with the United States District Court a petition for appeal to the United States Supreme Court from the decision of the lower court in the injunction case of the Cincinnati & Hamilton Traction Company and the Ohio Traction Company against the city of Cincinnati to prevent the enforcement of an ordinance requiring a 5-cent fare between Cincinnati and Hartwell.

The decision of the District Court was in favor of the companies and the findings were as follows:

That the Cincinnati & Hamilton Traction Company as owner and the Ohio Traction Company as lessee have a perpetual right to maintain and operate a street railway over Erkenbrecher Avenue from the entrance of the Zoological Garden to the Carthage pike, except as to the east 241 ft. of Erkenbrecher Avenue, over which the plaintiffs have the present right to maintain and operate a street railway.

That the plaintiffs have a perpetual right to maintain and operate a street railway over Carthage Pike, from

Ludlow or Erkenbrecher Avenue to the northern terminus of said pike, at or near the Carthage Fair Grounds, by virtue of the grant from the County Commissioners under date of March 23, 1889.

That the plaintiffs have the right at least until Aug. 7, 1919, to operate over Main Street and Lockland Avenue in the former village of Carthage, from the northern terminus of Carthage Pike, to the north corporation line of said former village, by virtue of the ordinance of the village of Carthage, passed on Aug. 7, 1894.

That the plaintiffs have the right to maintain and operate a street railway over Wayne, Rural and De Camp Avenues, in the former village of the Hartwell, at least until Sept. 16, 1921, by virtue of the ordinance of the village of Hartwell, dated Sept. 16, 1896, and May 14, 1900, respectively.

That the plaintiffs have the right to maintain and operate a street railway on the Springfield Pike, from De Camp Avenue to the north corporation line of the city of Cincinnati in the district formerly known at Hartwell, until at least March 14, 1925, by virtue of the grant from the company owning said pike, dated March 19, 1895; and the grant of the Board of County Commissioners of Hamilton County, Ohio, dated March 14, 1900, for a period of twenty-five years.

Illinois Traction System Accident Circular

The Illinois Traction System, Peoria, Ill., has mailed an accident circular over the signature of C. F. Handshy, assistant general manager, to each agent, foreman, head of department and subhead. This circular, which has been posted on all bulletin boards, reads in part as follows:

"The year ended June 30, 1914, shows that there were fewer accidents and personal injuries than during the previous year. This is certainly very gratifying, yet we feel quite well satisfied that the number of accidents can be reduced still further by each employee making it his business to watch not only himself but others in an endeavor to keep down accidents. Employees on trains should watch all passengers, cautioning them, when necessary, as to any possible danger to themselves and the likelihood of accidents or personal injury to others. The number of accidents to persons boarding or leaving cars at railroad crossings has been reduced, but the number is still alarming, and trainmen should give their particular attention to this class of accidents."

Suburban Fare Suit in Cincinnati.—Suit is to be filed by Assistant City Solicitor Constant Southworth of Cincinnati to enjoin the Interurban Railway & Terminal Company from charging more than a 5-cent fare from Cincinnati to Kennedy Heights.

Serving the I. C. C. Order.—The order of the Interstate Commerce Commission in the 5 per cent case, reference to which was made in last week's issue of the ELECTRIC RAILWAY JOURNAL, directs that a copy shall be served upon the carriers directly concerned in the case and also upon a number of agents, including A. L. Neereamer, chairman of the Central Electric Traffic Association.

Interchange with Traction Line.—The Chicago, Ottawa & Peoria Railway, Ottawa, Ill., has begun the construction of a connection with the Chicago, Burlington & Quincy Railroad at Ottawa, Ill. The steam road objected to interchanging traffic with the electric railway, but lost the case before the Public Utilities Commission of Illinois. Traffic rates governing the interchange are now being compiled.

Parking Cars in Indianapolis Streets.—The Indianapolis Traction & Terminal Company, Indianapolis, Ind., has received an extension of the time in which to obey an order made more than a month ago to discontinue parking its cars in the downtown streets of that city. J. Harry Johnson, chief of the Indianapolis fire department, declared that the parking of cars in the streets was a menace to the efficiency of the fire department.

Cincinnati Street Railway Men Enjoy Three-Day Outing.—The annual outing of the street railway men at Cincinnati was concluded on the evening of Aug. 9, having continued for three days. It was held at Chester Park, near the city. The wives and families of the men were present much of the time. A vote of thanks was tendered to General Manager I. M. Martin of the Cincinnati Traction Company and Assistant General Manager J. M. Martin for their co-operation in making the affair a success.

Trespassers on Illinois Railroad to Be Arrested.—With the consent of Governor Dunne the Illinois Public Utility Commission will instruct municipal and railroad authorities to arrest all trespassers on railroad right-of-way. It is believed that people will cease to take such dangerous cut-offs when they realize that they will be fined. A general campaign also will be conducted to educate the public on the danger of grade crossings and to teach them to heed the railroad danger and warning signs. An inspection of all grade crossings in Illinois is now being made, and all dangerous crossings will be ordered protected by the commission and such changes suggested as may be deemed necessary in the cases of crossings already protected.

"Why We Need the Nickels."—The Brooklyn (N. Y.) Rapid Transit System has reprinted in pamphlet form the continued story "Why We Need the Nickels," which appeared as paid advertisements in the Brooklyn newspapers recently. The introductory note printed in the pamphlet follows: "The Brooklyn Rapid Transit System, feeling that a better understanding of some of its problems is necessary to the establishment of that measure of co-operation which the company desires to maintain with its patrons, has issued from time to time chaptered advertisements explaining 'Why We Need the Nickels.' In order that some of our friends may read this story as a whole, we reprint these advertisements and hope that they may be of more than passing interest to all who give attention to the great problem of urban transportation." Some of the advertisements have been reprinted in the ELECTRIC RAILWAY JOURNAL.

Waiting Stations in Manila, P. I.—The *Cable News-American* of June 27 contained the following editorial commenting on the offer of C. N. Duffy, vice-president of the Manila Electric Railroad & Light Company, Manila, P. I., to erect waiting stations for the convenience of the public at the five important junction points in the city: "In another column is published certain correspondence explaining in detail the proposition of the Manila Electric Railroad & Light Company to erect at its own expense waiting stations at five different points in the city, provided the land for the stations owned by the city or the insular government be granted rent free. The company agrees to maintain and provide for the lighting and cleaning of the same. This is good news. The public will appreciate it. When the necessary permission is received, Mr. Duffy promises to commence the construction work at once and estimates that it will be finished within thirty days. The conditions are fair and should receive the immediate attention of the municipal board. The company proposes that the five waiting stations shall be of the same type, dimensions and construction as the one now in service on Calle Taft, opposite the Philippine Hospital."

Regulating Traffic on Fifth Avenue, New York.—Seeking to facilitate traffic movement on Fifth Avenue, the New York City Police Department has recently been experimenting in the half mile between Fortieth and Fiftieth Streets. The problem for all the tests was to move the heavy traffic, principally automobile, simultaneously over this interval in the busy afternoon hours. At each intersection a traffic policeman took orders from a signal flag mounted on a pole in the center of the avenue at Forty-fourth Street. In the first tests arbitrary intervals were chosen—50 sec. for crosstown traffic, succeeded by a period of 2 min. and 10 sec. for Fifth Avenue traffic. Later a change was made by choosing the policeman at Forty-second Street, the principal crosstown thoroughfare in the district, as the key to the system. This officer adjusted the two rectangular movements according to his own judgment, communicating his decisions to the main signalman at Forty-fourth Street, who relayed the signals. Left-hand turns were not allowed during the tests. Though it is stated that the systems tested had aided traffic, the Police Department will carry them further before a decision is made. It has also been suggested that safety zones be established at each street intersection and that all traffic, unless it is going straight, move around these centers counter-clockwise, branching to the right at the desired points. In practice, of course, this system would also be subject to some regulation.

Personal Mention

Mr. George W. Quackenbush has resigned as traffic manager of the Illinois Traction System, Peoria, Ill., effective on Oct. 1.

Mr. James H. Hustis has resigned as president and as a director of the New York, New Haven & Hartford Railroad and will hereafter devote himself to the interests of the Boston & Maine Railroad, of which he is president.

Mr. Howard Elliott, chairman of the board of the New York, New Haven & Hartford Railroad, has been elected president of the company to succeed Mr. James H. Hustis, who continues as president of the Boston & Maine Railroad.

Mr. E. J. Chamberlin, president of the Grand Trunk Railway and the Grand Trunk Pacific Railway, has also been elected president of the Montreal & Southern Counties Railway, Montreal, Que., succeeding the late W. Wainwright.

Mr. Frank Scott, treasurer of the Grand Trunk Railway, and heretofore treasurer of the Montreal & Southern Counties Railway, has been elected vice-president and treasurer of the Montreal & Southern Counties Railway, Montreal, Que.

Mr. Harper Boyd has been appointed superintendent of the Tarentum, Brackenridge & Butler Street Railway, Tarentum, Pa., to succeed Mr. F. C. Hornstein, who has become superintendent of the Lebanon & Ephrata Traction Company, Lebanon, Pa.

Mr. W. M. Hitt has resigned as electrical engineer with the Public Service Commission of Washington to accept a position with Mr. Henry I. Lea, consulting gas engineer of Chicago, who is at present valuing the property of the Seattle Lighting Company.

Mr. Harry G. D. Nutting has resigned as assistant to the president of the Wisconsin Public Service Company, Wisconsin Railway, Light & Power Company, and the Evanston (Ill.) Railway to engage in business for himself as a public utility expert, with offices in Milwaukee, Wis.

Mr. C. C. Trees, who has been auditor and assistant secretary of the Indiana Railways & Light Company, Kokomo, Ind., for the last eight years, has been appointed to the position of examiner of accounts in the valuation department of the Interstate Commerce Commission with headquarters in Chicago.

Mr. J. N. Graham has been appointed to succeed Mr. L. W. Jacques as master mechanic of the Rockford & Interurban Company, Rockford, Ill. Mr. Graham was assistant to the master mechanic of the company for the last three years. Previous to that he was in the employ of the Fort Wayne & Northern Indiana Traction Company at Fort Wayne, Ind.

Mr. Clarke M. Rosecrantz, counsel for The Milwaukee Electric Railway & Light Company and other public service corporations in Wisconsin, has retired from the firm of Van Dyke, Rosecrantz, Shaw & Van Dyke, and will leave Milwaukee to become, on Sept. 1, a partner in the firm of Sullivan & Cromwell, New York, general counsel for the North American Company. Mr. Rosecrantz was formerly employed by Sullivan & Cromwell and since he left eighteen years ago he has been counsel for many public service companies in the West.

Mr. R. L. Rand has been elected vice-president of the Richmond Light & Railroad Company, New Brighton, Staten Island, N. Y., to succeed Mr. H. F. Hazelrigg. Mr. Rand was formerly connected with the Alabama Traction, Light & Power Company, which controls among other companies the Huntsville Railway, Light & Power Company, the Horne Alabama Railway, Power & Manufacturing Company, the Alabama Power Company, the Anniston Gas & Electric Company and the Muscle Shoals Hydroelectric Power Company. He has been engaged in public utility work for more than twenty-five years.

Mr. C. S. Banghart, whose appointment as general manager of the Binghamton (N. Y.) Railway was announced in the ELECTRIC RAILWAY JOURNAL of Aug. 1, was tendered a dinner by the members of the Deportation Club of New York at the Seabourn Hotel, Coney Island, on the evening of Aug. 7. Among those present in addition to Mr. Banghart were W. O. Wood, president of the New York & Queens County Railway, with which Mr. Banghart was connected, and Messrs. W. R. Kerschner, George Robinson, E. R. Mason, Ross Hays, William Wampler, J. H. Denton, Charles Ellicott, Harry Ransom and Edward Smith.

Mr. H. S. Curry, who has been appointed chief dispatcher of the Illinois Traction System, with headquarters at Staunton, Ill., was born in Vinton County, Ohio, on May 30, 1882. Mr. Curry has been in railway work for the last ten years. He started as a conductor for the Springfield (Ohio) Railway. He worked for several city companies previous to 1908, at which time he entered the service of the Dayton & Troy Electric Railway at Tippecanoe City, Ohio. Mr. Curry served this company successively as motorman, dispatcher and timekeeper, resigning on June 1, 1912, to become connected with the Illinois Traction System as train dispatcher.

Mr. F. C. Hornstein, superintendent of the Tarentum, Brackenridge & Butler Street Railway, Tarentum, Pa., has resigned to accept the superintendency of the Lebanon & Ephrata Traction Company, Lebanon, Pa. About six miles of that road are to be constructed to complete the 30-mile run, and Mr. Hornstein will have charge of the construction and will assume the superintendency of the road when it is put into operation. Mr. Hornstein was formerly with the Westinghouse Electric & Manufacturing Company and built the overhead construction of the Tarentum, Brackenridge & Butler Street Railway. When the line was completed he was made superintendent of the company.

Mr. W. W. Waterson, who has been appointed superintendent of the Peoria Division of the St. Louis, Springfield & Peoria Railroad, included in the Illinois Traction System, with headquarters at Mackinaw Junction, Ill., became connected with the McKinley interests at Fort Wayne, Ind., on what was known as the Fort Wayne & Southwestern Traction Company and was employed there in the train service from 1902 until October, 1904. When the Indiana property was disposed of by the McKinley interests Mr. Waterson went to Springfield, Ill., as a trainman with the Illinois Traction System. This was in November, 1904. After being employed a short time in the train service he was promoted to be train dispatcher. He has been connected with the Illinois Traction System continuously since that time and has served in turn as train dispatcher, terminal superintendent, train master, assistant superintendent and superintendent.

Mr. F. R. Edmonston, who has been appointed superintendent of transportation of the Illinois Traction System, Peoria, Ill., having jurisdiction over all lines west and north of Decatur, and south of Springfield, with headquarters in Springfield, was born in Galloway County, Mo., on Dec. 2, 1878. Mr. Edmonston was connected with the Chicago & Alton Railroad at various places on the Kansas City Division, as student-operator and agent from April, 1894, to September, 1896. He was with the Wabash Railroad at various places on the Kansas City Division as telegraph operator, agent, trainmaster's clerk and train dispatcher, from September, 1896, to September, 1907. Mr. Edmonston next entered the service of the Missouri, Kansas & Texas Railroad at New Franklin and Moberly, Mo., serving as train dispatcher and chief train dispatcher from September, 1907, to March, 1913. He was appointed division superintendent of the Illinois Traction Company, Northern Division, on March 10, 1913, and served in that capacity until Aug. 1, 1914, when he was appointed superintendent of transportation with jurisdiction as noted previously.

Mr. John E. Vaughn, general cashier for the Shore Line Electric Railway since July 7, 1913, with headquarters at the general office of the Plant lines in Norwich, Conn., has been appointed purchasing agent of the Shore Line Electric Railway and the Norwich & Westerly Traction Company, both of which are included in the Plant system. Mr. Vaughn was born in Warwick, R. I., on April 25, 1872. He attended the grammar school in Central Village, the high school at Danielson, and was a student at Peddie Institute, Heightstown, N. J., for two years. He entered the service of the dry goods house of the Hartwell-Richards Company in Providence, and worked his way through Brown Univer-

sity. Having completed his studies, Mr. Vaughn went to Boston and passed two more years in the dry goods business. He had overworked his eyes, however, during his studies and was forced to retire from active work for a year. In 1903 he was appointed a conductor on the Worcester & Connecticut Eastern Railway and in May, 1904, was made a clerk on the office of the company. On Jan. 1, 1905, Mr. Vaughn was made cashier and chief clerk of the Consolidated Railway, the successor company. He rendered various services in Webster, Mass., during his term as cashier. He then returned to Dayville and in 1907 went to Norwich and had charge of the office of the Shore Line Electric Railway there for more than six years.

Mr. G. Gordon Gale has been appointed manager of the Hull (Que.) Electric Company. Prior to 1907 he was assistant engineer of the Canadian Rubber Company's electrical plant. From 1907 to November, 1908, Mr. Gale was superintendent of power of the Hull Electric Company and from November, 1908, to 1909 was acting superintendent of the company. From 1909 to June, 1914, Mr. Gale was general superintendent of the Hull Electric Company. He is a graduate of McGill University and an associate member of the Institute of Electrical Engineers, and of the Canadian Society of Civil Engineers. The company of which Mr. Gale has just been appointed manager controls and operates 27.5 miles of electric railway connecting Ottawa, Hull and Aylmer, and furnishes power for lighting. It also owns and controls Queen's Park, Hull. The position of general manager is a new one with the company.

G. Gordon Gale

OBITUARY

Henry C. Wood, associated with the construction of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., died at his home in Wheaton on Aug. 8. He was a member of the law firm of Wood & Lounsbury, Chicago. Mr. Wood was born in Philadelphia on Oct. 3, 1863, and was graduated from the Columbia Law School in 1886. For two years he practiced law in St. Paul, and in 1888 was appointed United States district attorney at Duluth. In 1892 he went to Chicago and was connected with a number of interurban properties in the Central West during the last ten years.

John R. Bowman, division passenger agent of the Southern Traction Company and the Texas Traction Company, Dallas, Tex., and former private secretary to Governor T. M. Campbell of Texas, is dead. Mr. Bowman was born at Plano, Tex., on April 17, 1876. He was graduated from Southwestern University at Georgetown in 1897. He received his law degree at the University of Texas and studied at Vanderbilt University. He moved to Amarillo and began the practice of law. He was elected to the State Legislature, serving a part of two terms, resigning to become private secretary to Governor Campbell. He became connected with the railways previously mentioned about two years ago.

Henry L. Oestreich, the senior assistant division engineer of the Public Service Commission for the First District of New York, in charge of the Fourth Avenue Subway, died on Aug. 13 in Atlantic City from septic poisoning. Mr. Oestreich was born in New York and was graduated from New York University. He had always been associated in subway building. When the old Rapid Transit Commission began the construction of the original subway in 1900, Mr. Oestreich was assistant engineer to the commission, and had charge of that section from Astor Place to Eighteenth Street. During the next three years he supervised the construction of the sub-surface structures between Fourteenth Street and the Battery, and the Center and Delancey Street subways.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Lehigh-Buffalo Terminal Railway, Buffalo, N. Y.**—Incorporated in New York to build an electric or steam railway in Buffalo. Capital stock, $50,000. Directors: John A. Middleton and Thomas M. Jarvis of New York, and Lyman D. Smith, Brooklyn.

***Ohio River Electric Railway & Power Company, Pomeroy, Ohio.**—Incorporated in Ohio presumably as the successor to the company now operating in Pomeroy. Capital stock, $10,000. Incorporators: I. L. Oppenheimer, J. W. Wolfe, D. W. Hennesey, George Wanger and W. R. Plantez.

FRANCHISES

*Opelika, Ala.—W. L. Carmack, Opelika, has received a thirty-year franchise from the Council to build an electric railway in Opelika. This is part of a plan to build an electric line between Opelika and Auburn. A company will soon be organized to construct this line, for which right-of-way has been secured.

Los Angeles, Cal.—The Los Angeles Railway has received an extension of time of six months on its franchises from the Council in which to complete its tracks on South Main Street between Slauson Avenue and Manchester Avenue in Los Angeles.

Pomona, Cal.—The Pacific Electric Railway has received a franchise to cross North Garey Avenue and Fulton Road in Pomona. This is part of a plan to build a short cut for the San Bernardino line between Lordsburg and North Pomona.

San Francisco, Cal.—The Daniel O'Day Company has received a franchise from the Council to build an electric railway on the north side of Mariposa Street from the east line of York Street, to connect with the main line of the Ocean Shore Railroad, and to lay a temporary spur track on the west line of Hampshire Street from a connection of the temporary track on Mariposa Street in San Francisco.

Wilmington, Del.—The Wilmington City Railway has received a franchise from the Council to extend its lines to Concord Heights in Wilmington.

*Clearwater, Fla.—Charles H. Evans, H. A. Murphy and James H. Murphy have received a franchise from the Council to build an electric railway and other public utilities in Clearwater.

Neodesha, Kan.—The Independence, Neodesha & Topeka Traction Company has received a franchise from the Council in Neodesha. This 17-mile line will connect Independence, Neodesha, Altoona and Topeka. T. J. Booth, Independence, president. [E. R. J., July 4, '14.]

Hopkinsville, Ky.—The franchise providing for the construction of an electric railway in Christian County was sold to R. E. Cooper, said to be representing Eastern capitalists who will build the electric line in Hopkinsville. A companion franchise, relating to the city, will be sold on Aug. 22.

Pittsfield, Mass.—The Berkshire Street Railway will ask the Council for track locations near the new railroad station in Pittsfield.

Buffalo, N. Y.—The International Railway has asked the Public Service Commission for permission to extend its tracks through Tracy Street to connect the Grant and Elmwood lines in Buffalo.

Ithaca, N. Y.—The Ithaca Traction Company has received the Mitchell Street-College Avenue franchise from the Council in Ithaca, with the stipulation that a double-track be laid in Eddy Street and a ten-minute schedule in either direction maintained.

Schenectady, N. Y.—The Schenectady Railway will ask the Council for franchises to extend its lines in Schenectady to South Schenectady and to the Grand Boulevard. The company will also ask the Board of Trustees in Rotterdam for a franchise.

Wilmington, N. C.—The Tidewater Power Company has asked the Council for a franchise to build several additional crosstown lines in Wilmington.

Wilmington, N. C.—The Wilmington-Carolina Beach Railway has asked the Council for a franchise in Wilmington. This is part of a plan to build an electric line to connect Wilmington and Carolina beaches. Joseph L. Loughlin, secretary. [E. R. J., Aug. 8, '14.]

Wilmington, N. C.—The Wilmington & Fort Fisher Railway has asked the Council for a franchise in Wilmington. This is part of a plan to build an electric line from Wilmington to Fort Fisher Sea Beach, a distance of 18 miles. Lawrence Kure, Wilmington, secretary. [E. R. J., Aug. 8, '14.]

Dartmouth, N. S.—The Dartmouth & Cow Bay Electric Railway has received an extension of time on its franchise from the Nova Scotia Legislature to build this projected railway from Dartmouth to Cow Bay Beach, Halifax County, N. S.

Portland, Ore.—The Portland & Oregon City Railway will accept the franchise for an interurban line on the East Side, to connect up with a line now being built from Oregon City to Portland. The franchise as fixed by the City Council will be advertised for twenty days, after which it will be set up for final passage by the Council. Sixty days after passage, it will go into effect, and the company can begin actual construction and will be given a year's time to complete the work of building the line.

Dallas, Tex.—The Dallas Northwestern Traction Company has asked the Council for an extension of time of six months on its franchise in which to build its line in Dallas. This 50-mile line will connect Dallas, Wichita Falls and Denton. E. P. Turner, Dallas, president. [E. R. J., Feb. 21, '14.]

Danville, Va.—The Danville Traction & Light Company has received a franchise from the Council for an extension of its lines through the eastern section of Danville.

Seattle, Wash.—Councilman Erickson has asked the City Council for a franchise for an extension of the municipal railway into Ballard. The ordinance also instructs the public utilities department to prepare for immediate extension. The extension as proposed will begin at the western terminus of Division "A" and extend in a northwest direction across the recently voted bridge at Fifteenth Avenue Northwest, into Ballard. Provision is made for the construction of the extension by the issuance of public utility bonds. The ordinance was referred to the city utilities committee, which will prepare a definite routing for the proposed railway and work out details of its cost of construction and maintenance.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The extension of the Boyles line 1½ miles from Boyles to Tarrant City has been placed in operation.

Edmonton (Alta.) Interurban Railway.—A by-law has been passed authorizing the expenditure of $168,000 by the City Council on electric railway extensions in Edmonton. Plans are being considered to build a line from Edmonton to Fort Saskatchewan, Alta.

Nelson (B. C.) Street Railway.—Plans are being considered to improve and extend this company's lines in Nelson.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company has awarded a contract to the Westminster Iron Works to build an ornamental arched entrance to Central Park. The cost is estimated to be about $4,000.

Visalia Electric Railway, Exeter, Cal.—Work has been begun by this company on a 3-mile extension from Woodlake to the base of the foothills in Tulare County.

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company on the extension of the line from Arlington to Corona.

***Niland, Cal.**—Preliminary arrangements are being made to build an electric railway between Niland, Blythe and Seeley. A. L. Faas, Arthur E. Hull, P. A. Raab, G. Ghiglieri and John D. Reavis are interested.

San Francisco (Cal.) Municipal Railway.—The new municipal line in San Francisco from Market Street down Van Ness Avenue to the grounds of the Panama-Pacific International Exposition has been placed in operation.

Norwalk & New Canaan Street Railway, Norwalk, Conn.—This company has awarded a contract to the Conkling & McGrath Company, New York, to build this line between Norwalk and New Canaan. M. W. Conkling, New York, president. [E. R. J., June 27, '14.]

New Smyrna, Fla.—Preliminary arrangements are being made to build an electric railway between New Smyrna, Lake Helen and the St. Johns River. Eventually it will extend on through to the west coast of Tampa. S. E. Carmichael, Lake Helen, is interested. [E. R. J., June 6, '14.]

Lee County Central Electric Railway, Lee Center, Ill.—This company, which purchased the property of the Northern Illinois Electric Railway, operating a 12-mile line between Amboy and Middlebury, plans to extend the line to connect Amboy, Lee Center, Rochelle, DeKalb, Princeton and Dixon. Officers: H. W. Hillison, Franklin Grove, president; William S. Frost, Jr., Franklin Grove, vice-president; S. L. Shaw, Lee Center, secretary; Andrew Aschenbrenner, Amboy, treasurer; C. A. King, general manager and superintendent, and E. S. Virgil, Lee Center, engineer. [E. R. J., July 25, '14.]

Evansville, Chrisney & Eastern Railway, Evansville, Ind.—The bonds of this railway have been disposed of and plans are being made to begin construction within the next two months on the line between Booneville and Chrisney. Eventually it is intended to extend this line to Tell City and Cannelton, Ind. J. P. Chrisney, Chrisney, president. [E. R. J., April 11, '14.]

Evansville & Indianapolis Light, Power & Electric Railway, Evansville, Ind.—Surveys have been completed between Indianapolis and Washington, 80 miles, and surveys are now under way from Washington to Petersburg, 30 miles. This line will connect Evansville and Indianapolis, via Oakland City, Petersburg, Washington, Bloomfield, Worthington and Spencer. Arthur C. Stone, Evansville, president. [E. R. J., Dec. 6, '13.]

Evansville & New Harmony Traction Company, Evansville, Ind.—At a meeting of the officers of this company held at Cynthiana the business men of the town agreed to raise $30,000 to help finance the railway. It is now decided that this line will pass through Cynthiana. [E. R. J., Aug. 1, '14.]

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—An agreement was entered into recently between French Quinn, receiver for the Fort Wayne & Springfield Railway, and the Fort Wayne & Northern Indiana Traction Company for the latter to build from Rudisill to McKinnie Avenue in Decatur. The track is to be used by the Fort Wayne & Springfield Railway in Decatur.

***Jeffersonville, Ind.**—Large shipments of cable are being received at New Albany, Ind., preparatory to constructing a high tension line across the Ohio River, to connect the power plant of the Louisville Gas & Electric Company with New Albany and Jeffersonville. It is proposed to lay the cable across the Pennsylvania bridge at Fourteenth Street.

Richmond & Hamilton Traction Company, Richmond, Ind.—Interest in this railway, which was recently incorporated, is increasing, and petitions have been filed signed by the property owners of two townships, one including the city of Richmond, with the county commissioners of Wayne County, asking that special elections be called to vote on the question of subsidies. Eugene Purtelle, promoter. [E. R. J., Aug. 1, '14.]

Sioux City (Ia.) Service Company.—About 1½ miles of track are being relaid in paved streets in Sioux City.

Quebec Extension Railway, Presque Isle, Maine.—Surveys have been completed and plans are being made to begin construction in 1915 by this company for its 100-mile line between Washburn and Quebec. It will extend across the northern part of Maine to connect the existing lines at Quebec and New Brunswick, and across New Brunswick to the Quebec border. [E. R. J., Jan. 31, '14.]

Transcona, Man.—Bids are to be called at once for the construction of the electric line from Winnipeg to Transcona,

to be built by J. H. Kern, Moose Jaw. The line is to be completed by December, according to a change effected in the agreement with the Transcona Council. [E. R. J., June 20, '14.]

Winnipeg (Man.) Electric Railway.—The Manitoba Public Utilities Commission has directed this company to prepare plans for the immediate laying of a second track through the St. James subway. The Winnipeg Board of Works has approved of plans for the laying of a second track on Notre Dame Avenue west, to provide a new loop with the Notre Dame, Keewatin Avenue and Logan Avenue lines in Winnipeg. The company has prepared new plans to build a second track on Sargent Avenue and is asking the City Council to approve them.

Grosse Isle Railway, Detroit, Mich.—This company, which was organized several years ago to build a 10-mile electric railway around Grosse Isle, has abandoned the plan to build a railway as it was thought that the transportation upon the island could be taken care of much better in another way. [E. R. J., Aug. 1, '14.]

Michigan Railway, Jackson, Mich.—This company has practically completed its 50-mile line between Grand Rapids and Kalamazoo. H. H. Crowell, 939 Michigan Trust Building, Grand Rapids, president.

United Railways, St. Louis, Mo.—This company has been requested by the Missouri Public Service Commission to extend its Fourth Street line by way of Grand Avenue to the new viaduct entrance to Carondelet Park in St. Louis.

***Bozeman, Mont.**—A new electric railway 150 miles long to cross the Gallatin Valley west from Bozeman and thence to follow Elk Creek over to the Madison Valley, and the Madison Valley south to Yellowstone at the west entrance of the Yellowstone Park is the project now being considered by Eugene W. Dawes, Bozeman, Charles L. Loomis, Kansas City, and associates.

Portsmouth (N. H.) Electric Railway.—The Boston & Maine Railroad, which owns the Portsmouth Electric Railway, is making extensive improvements on this line.

Albuquerque (N. M.) Interurban Railway.—No definite plans have yet been decided upon by this company to begin construction on this line to connect Albuquerque, Jemez Springs, Santa Anna, Almeda, Los Linas and Belen. E. J. Hall, Albuquerque, is interested. [E. R. J., June 21, '13.]

Jersey Central Traction Company, Keyport, N. J.—This company is now engaged in relaying 1½ miles of track in Keyport.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission has approved a supplementary contract between this company and the George W. McNulty Company, Inc., for the reconstruction of the Sea Beach line. The company is considering plans to extend the Jamaica Avenue elevated line and will soon award contracts for the construction of the branch.

South Flatbush Railroad, Brooklyn, N. Y.—This company, which was incorporated in January, 1909, to build a railroad in the extreme southern part of Flatbush, which never secured a franchise for the route, or issued any stock, was formally dissolved recently, when Supreme Court Justice Van Siclen signed the dissolution order. The proposed route of this line was from Brighton Beach elevated, to West Thirty-fourth Street, to Avenue Q and Flatbush Avenue. The extension of the existing lines so as to serve the territory where the new line was to be operated, caused the abandonment of the project.

Frontier Electric Railway, Niagara Falls, N. Y.—The right-of-way, property and holdings of this company were deeded recently to the International Railway, Buffalo. James S. Simmons, Niagara Falls, president. [E. R. J., Aug. 8, '14]

***Port Jervis, N. Y.**—Plans are being perfected to build an electric line from Port Jervis through Milford, Pa., to the Delaware Water Gap. Plans are being contemplated to purchase the Delaware Valley Railroad and enter East Stroudsburg over that line. The project is said to be backed by Philadelphia capital.

Schenectady (N. Y.) Railway.—Two extensions will be built at once by this company. The South Schenectady extension will extend from the end of the present line in Broadway to the tracks of the West Shore Railroad in South Schenectady. The Grand Boulevard line will be double-track and will extend from the present terminus in Nott Street to the intersection of the Boulevard, and thence to Van Antwerp Road.

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—Surveys have been completed from Chardon to Jefferson, 30 miles, and are now under way between Jefferson and Linesville, Pa., 18 miles. Grading has been begun. This line will connect with the Cleveland & Eastern Traction Company at Chardon, with the Pittsburgh & Ohio Valley Railway at Jefferson for Ashtabula and the extension to Linesville, Pa., will connect with the Northwestern Pacific Railroad for Conneat Lake, Meadville, Cambridge Springs and Erie. The maximum grade of this line will be 5 per cent. 80-lb. rails will be used and one 100-ft. steel bridge will be built. F. A. Pease, Cleveland, engineer. [E. R. J., June 20, '14.]

Cleveland, Alliance & Mahoning Valley Railroad, Cleveland, Ohio.—The link between Newton Falls and Leavittsburg will be completed by this company within a few months. This will serve as a connection between the group of towns, including Canton, Akron and Alliance, and the group further north, comprised of Warren, Niles, Youngstown and several other important places. Some time ago the line was completed to Newton Falls and it is now in operation from Alliance through Ravenna to this point. When the entire line is completed it will be about 80 miles long. C. R. Morley is president of the company; J. M. Blatt, vice-president, and W. H. Heil, secretary and treasurer, with offices in the Prospect Building, Cleveland. [E. R. J., March 28, '14.]

Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.—Right-of-way has been obtained by this company for an extension from the present terminus of the railway just south of the city limits of Monroe. It is thought the company eventually will extend its tracks to Monroe.

Interstate Electric Company, Tulsa, Okla.—Application for a charter will soon be made by this company to build a network of interurban electric railways covering the State of Oklahoma. The first line will be from Tulsa to Muskogee and the next one from Tulsa west to Orumright, Cushing and Guthrie. This line will branch at Cushing and go from there to Stillwater, Perry and Enid. C. B. Hale is interested. [E. R. J., July 11, '14.]

***Blenheim, Ont.**—An organization has been formed with Mayor Little, Blenheim, as president, to consider plans to build a hydro-radial railway from St. Thomas to Amherstburg.

Fort William (Ont.) Electric Railway.—It is proposed to build a double track line on Victoria Avenue, as far west as Franklin Street, and a single track from Franklin Street south to Walsh Street in Fort William.

London & Port Stanley Railway, London, Ont.—This railway, the electrification of which the ratepayers authorized last January, is being reconstructed rapidly and will be placed in operation very shortly. The Pere Marquette Railroad has the rehabilitation contract.

Dunnville, Wellanport & Beamsville Electric Railway, Wellanport, Ont.—A resolution has been passed by the Clinton Township Council, asking the Hydro-Electric Power Commission of Ontario to take over this uncompleted line, and incorporate it with a general system of lines to be built under the commission's auspices.

Harrisburg & Mechanicsburg Electric Railway, Harrisburg, Pa.—This company has obtained permission from the Pennsylvania Public Service Commission to apply to the City Council for an extension of its tracks in Harrisburg.

Pittsburgh (Pa.) Railways.—This company is asked to consider plans to build an extension from Avalon to downtown Pittsburgh. The plan is to extend the Avon and Emaworth lines to connect with the West View Park line.

Pottstown & Phoenixville Railway, Pottsville, Pa.—Surveys will be made at once by this company for an extension from Stowe to Reading.

Regina (Sask.) Municipal Railway.—The City Council of Regina has authorized the purchase of one single track, three-part Y with crossover, at a cost of $3,129, which is required for this railway intersection at the north end of the Broad Street subway in Regina.

Wheeling (W. Va.) Traction Company.—Plans are being considered by this company to build a steel and concrete bridge across the Ohio River at Tiltonsville connecting the West Virginia side above Warwood with Tiltonville, Rayland and Yorkville on the Ohio side. It is understood that ground on both sides of the river is now being leased for the purpose.

SHOPS AND BUILDINGS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The contract for the construction of this company's new building at First Avenue and Twenty-first Street in Birmingham has been awarded to the Realty Construction Company. The Herndon-Mettrick Engineering Company had previously been awarded the concrete contract. The structure will be four stories in height, as nearly fireproof as possible and is estimated to cost about $75,000.

Calgary (Alta.) Municipal Railway.—A proposition is under consideration in Calgary for the erection of a public utilities building, in which would be combined offices, recreation rooms for the employees of the Calgary Municipal Railway and other departments, and a public waiting room.

Pacific Electric Railway, Los Angeles, Cal.—This company has awarded a contract to the Alta Planing Mill Company, Los Angels, to build a new passenger station in El Segundo. The structure will be 58 ft. x 38 ft. and of mission style of architecture. It will have a long platform for loading freight.

Peoples' Traction Company, Galesburg, Ill.—The present passenger station for this company and the Rock Island Southern Interurban Railway will be vacated. It is reported that the new depot will be in the Galesburg National Bank Building in Galesburg.

Brooklyn (N. Y.) Rapid Transit Company.—This company has opened its new station under the Municipal Building for the trains running through the Centre Street Loop in Brooklyn.

Wheeling (W. Va.) Traction Company.—Contracts have been awarded by this company to build a new carhouse at McMechen, for the Moundsville division of this railway. The structure will be of steel, concrete and brick construction.

POWER HOUSES AND SUBSTATIONS

Birmingham-Tuscaloosa Railway & Utilities Company, Birmingham, Ala.—It is stated that this company has closed a contract with the Alabama Power Company to secure its water power for the operation of the electric railway in Tuscaloosa. This company plans to have its line to Tuscaloosa completed by October.

Pacific Electric Railway, Los Angeles, Cal.—This company's power house at Watts was partly destroyed by fire on July 30.

Jersey Central Traction Company, Keyport, N. J.—During the next few weeks this company plans to install at its power house in Keyport 1000-hp Sterling boilers lately purchased from the Babcock & Wheeler Company.

Public Service Railway, Newark, N. J.—This company has awarded a contract to Linde & Griffith, Newark, to build its new power plant at Point-no-Point. The plant will be erected on the banks of the Passaic River, north of Lincoln highway. Contracts have been let to build concrete foundations for a turbine-room, 95 ft. x 160 ft.; a boiler house, 124 ft. x 168 ft.; an outside coal bunker, 48 ft. x 56 ft., and a detached switch house, 70 ft. x 105 ft. The main building will be 160 ft. x 264 ft.

Wheeling (W. Va.) Traction Company.—Plans are being made to build a new power plant and generator station on the site of the present power house on Water Street, near Forty-first in Wheeling. The walls are to be built of brick and reinforced concrete. The building is being constructed about the present structure, and when completed the old walls will be razed.

Manufactures and Supplies

ROLLING STOCK

Empire United Railways, Syracuse, N. Y., which was reported in the ELECTRIC RAILWAY JOURNAL of Aug. 1 to be in the market for twelve interurban cars, has awarded the contract for these cars to the St. Louis Car Company.

Calgary (Alta.) Municipal Railway has received from the Preston Car & Coach Company a street sprinkler of 5000 gal. capacity with adjustable sprinkler heads at all four corners and a direct connected centrifugal pump so arranged that it can be used for fire fighting.

Los Angeles & San Diego Beach Railway, San Diego, Cal., will purchase sixteen new motor cars and a similar number of trail cars if the application which it has pending before the Railroad Commission of California for permission to issue bonds to electrify its line is granted.

Pacific Electric Railway, Los Angeles, Cal., is reported to be considering the purchase of forty-four all-steel interurban cars for the new line extending for 59 miles between Los Angeles and San Bernardino. This new line, of which a brief description was published in the ELECTRIC RAILWAY JOURNAL for July 25, page 163, is now being operated with rebuilt cars intended only for temporary use.

New Orleans Railway & Light Company, New Orleans, La., has specified the following equipment for the fifty closed motor cars which it ordered recently from the Southern Car Company for delivery in October, November and December:

Seating capacity.....55	Conduits and junction boxes .....Sheroduct
Weight (car body only), 16,000 lb.	Curtain material..Pantasote
Bolster centers, length .....23 ft. 5¼ in.	Destination signs..Keystone
Length of body...34 ft. 8 in.	Hand brakes..Dayton handle
Over vestibule....47 ft. 8 in.	Headlights ....Crouse-Hinds
Width over all.....8 ft. 7 in.	Motors....G.-E. inside hung
Height, rail to top trolley board...11 ft. 3⅝ in.	Registers .....International
Body .....Metal	Sash fixtures.....Edwards
Interior trim, Wood and metal	Seats, style, H. & K. No. 300 A
Headlining .....Agasote	Seating material, Cherry slats
Roof, type.....Arch	Step treads, American abrasive
Underframe .....Metal	Trolley catchers or retrievers .....Earle
Bumpers, Hedley anti-climber	Trolley base .....G. E.
Car trimmings.....Bronze	Trucks, type.....Brill 39-E
	Ventilators..Railway Utility

TRADE NOTES

Pathé Frères, New York, N. Y., the French moving picture firm, announces that Arthur Roussel and L. P. Bonvillain, its ranking vice-presidents in America, are Frenchmen and that Mr. Bonvillain, together with other employees, is about to sail to join his regiment in France. Mr. Roussel is ill in New York and has not been told about conditions abroad. The immense factory of the company near Paris has been requisitioned by the government as a barrack for soldiers.

Union Switch & Signal Company, Swissvale, Pa., has received a contract from the Indianapolis Railway & Lighting Company, a 600-volt interurban line, for the installation of a.c. automatic block signals between Pit and Junction, 7.2 miles in Indiana. There will be eight model No. 13 electric light signals installed on the TDB system which will permit two trains to follow each other between turnouts but will prevent opposing movements. Vane relays will be used on the line circuits and galvanometer relays on track circuits.

Railway Utility Company, Chicago, Ill., reports orders for its thermostat control to be used on the 228 cars recently ordered by the Chicago Surface Lines, 100 cars ordered by the Pittsburgh Railways and twenty-five cars ordered by the Third Avenue Railway, New York. Utility ventilators have also been ordered for the vestibules of the 228 cars

ordered by the Chicago Surface Lines and for fifty cars ordered by the New Orleans Railway & Light Company, and the twenty-five cars ordered by the Third Avenue Railway, New York.

William R. Garton, New York, N. Y., sales engineer, has been appointed as exclusive general sales agent in the United States and Canada for the Zink adjustor and Zink radius, or circle bar brake connection. The Zink adjustor takes the place of all turn buckles used in connection with brakes. It can be adjusted readily and remains in fixed position until readjusted. It is in use on some of the largest properties. The radius or circle bar connection avoids the binding of brake bars and rods on double trucks when the truck is on a curve or standing at an angle.

General Electric Company, Schenectady, N. Y., has received the order for motors on the 100 additional steel cars to be purchased by the New York Municipal Railway Corporation under recent authorization by the Public Service Commission of the First District of New York. This order of 200 motors is a duplicate of the order that was placed for the first lot of cars for operation in new subways in New York City, covering 140 hp equipments of the GE-248 type without control equipment. The General Electric Company has also received an order for one 3000-kw rotary converter from the Transit Development Company for use on the Brooklyn Rapid Transit System. This includes the necessary transformers and switchboards for the converter, which will be a duplicate of the three machines recently ordered by the Brooklyn Rapid Transit System from the General Electric Company.

O. de G. Vanderbilt, Jr., president of the Weir Frog Company, Cincinnati, Ohio, is one of those manufacturers whom President Wilson has interviewed on the state of business in this country. In this interview, which occurred on Aug. 5, the President expressed himself as realizing very keenly the extremely bad conditions in the railway supply business, due to the very stringent economy which the railroads of the country have been forced to put into effect on account of the uncertainty as to future legislation affecting them and because of reduced earnings. He feels also that certain basic legislation is necessary before the business interests of the country can be put on a sound basis. As soon as this is in force it will be the attitude of the administration to remove all uncertainty as to future legislation and the position of the administration toward business. As regards the present situation in Europe, the President, according to Mr. Vanderbilt, feels that this country is in an admirable position to withstand the influences which will be brought about by the conflict abroad.

Harry G. D. Nutting has opened an office as a public utility expert and engineer in the First National Bank Building, Milwaukee, Wis. Mr. Nutting's services will be available for valuations, rates, audits, etc., for electric railway, electric light and other public services. After he was graduated from the College of Engineering, University of Illinois, Mr. Nutting did extensive experimental work for Fairbanks-Morse & Company. Later he was engineer for the Wisconsin Railroad Commission, manager of a municipal plant, district superintendent in charge of operation of eighteen towns in Illinois, and electrical engineer for the Government Arsenal at Rock Island. Mr. Nutting has retired from the position of assistant to the president of the Wisconsin Public Service Company, Wisconsin Railway, Light & Power Company and Evanston (Ill.) Railway to establish his own business. He has been retained by these companies as consulting expert. He is also consulting expert for the Berlin (Wis.) Public Service Company in connection with its rate case now pending before the Wisconsin Commission. He has been a contributor to technical literature and read a paper "An Accounting System for a Small Public Utility" at the January, 1914, convention of the Wisconsin Electrical Association. He is also chairman of the committee on extensions and commercial service rules of the association, and the author of a unique formula for determining the advisability of making extensions of distribution systems.

Walter D. Uptegraff, who has recently been elected president of the Union Switch & Signal Company, is, in point of service, one of the oldest men connected with the Westinghouse interests. He was fourteen years old when he became assistant to Howard Sprague, who was secretary of the Westinghouse Air Brake Company. This was in 1880. He quickly attracted the attention of George Westinghouse, the late inventor, who made the young man his private secretary. As Mr. Westinghouse's activities expanded, the responsibilities and duties of Mr. Uptegraff grew in proportion, and in 1896 Mr. Westinghouse showed his confidence in his secretary's ability by giving him his power of attorney to act for him in financial matters. In this capacity Mr. Uptegraff took an active part in the industrial affairs of the Westinghouse interests and was named by the late inventor as one of the three men to act as executor to his estate, the others being H. H. Westinghouse, his brother, and Charles A. Terry, a personal friend and business associate. Mr. Uptegraff, soon after the death of Mr. Westinghouse, was elected vice-president of the Union Switch & Signal Company and the Westinghouse Machine Company. Of both these concerns he had already been a director for some time. Besides his connection with the Switch & Signal Company as president, and the Westinghouse Machine Company as vice-president, he is a director in the Westinghouse Air Brake Company, president of the Pittsburgh Wall Paper Company, New Brighton, Pa., and president of the Defiance Paper Company, Niagara Falls, N. Y.

Sidney G. Johnson, who has been elected a vice-president and director of the General Railway Signal Company, Rochester, N. Y., with headquarters in New York, was born in Eccles, Lancashire, England, in 1874, and entered Harrowgate boarding school when he was about nine years old. At the age of twelve he came to America and went to Swissvale where his father, Henry Johnson, was works manager of the Union Switch & Signal Company. After about a year he went to Rahway, N. J., where the Johnson Railroad Signal Company had been established, and during vacations he worked in the shops and drawing office to acquire a knowledge of the business. He attended a New York preparatory school and for two years after leaving school he worked in the construction gang of the Johnson Signal Company, without pay, in order to learn the business, and then went into the construction forces of the Union Switch & Signal Company for a year. He was then about twenty years old. In 1896 the Standard Railway Signal Company was organized and Mr. Johnson's father was made president. Mr. Johnson was made signal engineer and had charge of the locking and dog sheets, making estimates, etc. When the company moved to Troy, Mr. Johnson went with it, but after the Trojan Car Coupler Company's interests took hold Mr. Johnson's father left the Standard and Mr. Johnson followed him after a few months, and went to the Union Switch & Signal Company in 1899 in the New York office. Shortly thereafter he was made engineer of construction for the Eastern district. Afterwards he was for two years at Swissvale as signal engineer in charge of the estimating department, and then went back to New York and had charge of installing the signal system for the Interborough Rapid Transit Company, New York, and all the other large installations put in at that time. When the Interborough job was finished he was made Eastern manager in charge of sales and construction. About four years ago he was made general sales manager and early in the present year was elected vice-president in charge of sales and engineering with offices in New York.

ADVERTISING LITERATURE

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a twenty-eight page pamphlet "Ball Bearings in Machine Tools."

Chicago Pneumatic Tool Company, Chicago, Ill., has issued a sixteen-page booklet in which the company's Class A. O. Giant fuel oil engines are described and illustrated.

Canton Foundry & Machine Company, Canton, Ohio, has issued "Portable Floor Crane and Hoists," a well-printed and attractive booklet so arranged as to be quite explicit in regard to the company's products.

Ohio Brass Company, Mansfield, Ohio, has issued a folding mailing card illustrating the application of the National

railroad trolley guard. The company says that more than 100,000 ft. of the guard is in service protecting grade crossings on many prominent roads.

Dielectric Manufacturing Company, St. Louis, Mo., has published "Data on Dependable Insulation," a forty-eight-page booklet. The information in regard to the goodly number of corelated subjects referred to in the publication is made readily available by a very helpful subject index.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued Bulletin No. 7 of the series covering comparative tests of standard open-hearth rails and titanium treated open-hearth rails. This bulletin contains microphotographs, sulphur prints and etched sections of rails of both types which characterized previous issues of the bulletin, new tests on three samples of each type being included.

National Tube Company, Pittsburgh, Pa., has reprinted as "National Bulletin No. 10-C" a paper by Dr. William H. Walker on the relative corrosion of iron and steel pipe as found in service. This paper is an abstract of one read before the New England Water Works Association on Dec. 13, 1911. Dr. Walker concludes after an investigation into the relative life of service pipes that on the average there is no difference in the corrosion of iron and steel pipe. The abstract of the paper is accompanied by two discussions on the subject.

Western Electric Company, Chicago, Ill., has issued a very attractive brochure on the use of the telephone for train dispatching. A brief historical account of the telephone development in train operation is given, together with an outline of the reasons why the telephone has been so largely introduced in railroad work. Numerous illustrations are provided to show methods of using telephone selector equipments and details of different types of apparatus which are used, and a number of letters from operating men regarding the use of the telephone in railroad service are reproduced.

S. K. F. Ball Bearing Company, New York, N. Y., has published a catalog "S.K.F. Ball Bearings as Applied to Electric Motors." Applications of this well-known ball bearing have been made to a great variety of motive apparatus, and electric railway men will be particularly interested in the installations made for the Third Avenue Railway, New York. The publication explains the principles of construction of this bearing and contains a number of interesting sectional drawings showing how the bearings may be mounted in alternators, rotary converters, motors and other apparatus used by electric railways.

The Ronald Press Company, New York, N. Y., has issued a 42-page catalog classifying and briefly describing 100 of the best books on accounting, banking, finance, salesmanship, valuations and other general business topics. In selecting them no endeavor has been made to give all business books on any subject or even all the best books, but to give under each heading the names of books generally accepted in business circles as the most reliable, authoritative and generally useful. The pamphlet should be invaluable to electric railway officials who desire to have readily available a carefully compiled list of general business books.

Ray D. Lillibridge, Inc., New York, N. Y., has designed and written for the Titan Storage Battery Company, Newark, N. J., a thirty-two-page booklet dealing with Titan storage batteries for electric vehicles, both trucks and pleasure cars, and for use with self-cranking systems on gasoline automobiles. The chapter headings follow: "The Titan Storage Battery Company: Its Organization and Purposes," "Storage Battery Parts," "Elementary Theory of the Storage Battery," "Titan Pasted Type Plates," "Storage Battery Measurements," "Titan Ignition and Lighting Batteries," "Titan Starting and Lighting Batteries" and "Titan Vehicle Batteries."

Spencer Trask & Company, New York, N. Y., have issued a forty-four-page pamphlet entitled "Knowledge of Investment," written by Charles Lee Scovil. As the author states, the selection of sound investments is largely a matter of education. The pamphlet discusses in a simple manner some of the intricate problems in connection with the buying and transfer of stocks and bonds. It is divided into four chapters, the first of which discusses such points as security of principle, excessive rates of interest, misleading statements, distribution of securities, and mortgages and deeds of trust. The second chapter takes up the difference between coupon and registered bonds, the proper procedure to be followed when bonds are lost and questions in connection with the redemption, payment and delivery of bonds. The last two chapters are devoted to a short analysis of the management of corporations, the rights of stockholders, the institution of a surplus reserve, the value of preferred stocks and the question of diversification of investments. The chief value of this pamphlet lies in its extremely practical discussion of investment points that are too often left unexplained in the standard books on corporation finance.

NEW PUBLICATION

Where and Why Public Ownership Has Failed. By Yves Guyot, editor-in-chief of the *Journal des Economistes*, president of the Société d'Economie Politique of Paris, former vice-president of the Municipal Council of Paris, deputy to the French Parliament and Minister of Public Works, etc. Published by The Macmillan Company, New York. 5½ in. x 8 in. Bound in cloth, 459 pages, $1.50 net.

The question of what State ownership and operation has generally accomplished in the world receives in this volume the most exhaustive treatment that has ever been given to the subject. M. Guyot, statesman, traveler, editor and economist, is able to speak with special authority on the subject because of his former ministerial position in France, which is surpassed by few countries in its activities along government ownership lines. The comprehensive character of the volume is shown by the following topics, which represent only a few of those covered: Municipal activity of the United Kingdom, United States, Germany, Russia, France, Austria-Hungary, Italy, Denmark, Switzerland, the Netherlands, Belgium, Sweden; State operation of railways; State and municipal bookkeeping and finance; private versus public initiative; housing of the working classes; government monopolies; State insurance; State and municipal employment, and graft and corruption.

M. Guyot's evident familiarity with conditions, together with the extremely complete data which he quotes and explains, makes his treatise extraordinarily valuable to the student of government ownership. The chief difficulty in preparing the book seems to have been to make a coherent arrangement of the material, but the author has attained a fair success in this respect. Specific examples and statistics gathered from every available source are brought to bear upon every theoretical argument usually relied upon by the advocates of State ownership, and the result is an uncompromising and effective attack against this principle.

While space will not permit a full review of M. Guyot's book, it may be interesting to note a few of its conclusions. The author firmly believes that when political or administrative bodies, whether states or municipalities, operate, they are regulating themselves. This to his mind is sufficient reason for the suppression of all public trading operations, because it is necessary that there be a distinct separation between the forces of operation and regulation. Industrial operation is inherently adapted to private enterprise, but the only corresponding function of State and municipality is industrial control. Mr. Guyot's treatment of the labor question is particularly comprehensive and the tenor of his remarks can be judged from the following final statement: "The suppression of the political and electoral rights of all employees of states and municipalities is an indispensable consequence of the development of public operation."

In general the author asserts that the propaganda of public ownership has established more firmly than ever before the truth of the following industrial laws: (1) Neither states nor municipalities should attempt tasks especially adapted to individual effort. (2) In the case of utilities in which public interest is general, as railways, water, gas and electric companies, and tramways, there must be a physically and morally responsible body, accountable to the public on the one hand and to the service on the other hand, and protected by contract against the vacillations of public opinion and the extortionate demands of interested groups, whether employees, consumers or patrons. (3) For individuals the watchword should be action; for local and state governments, control.

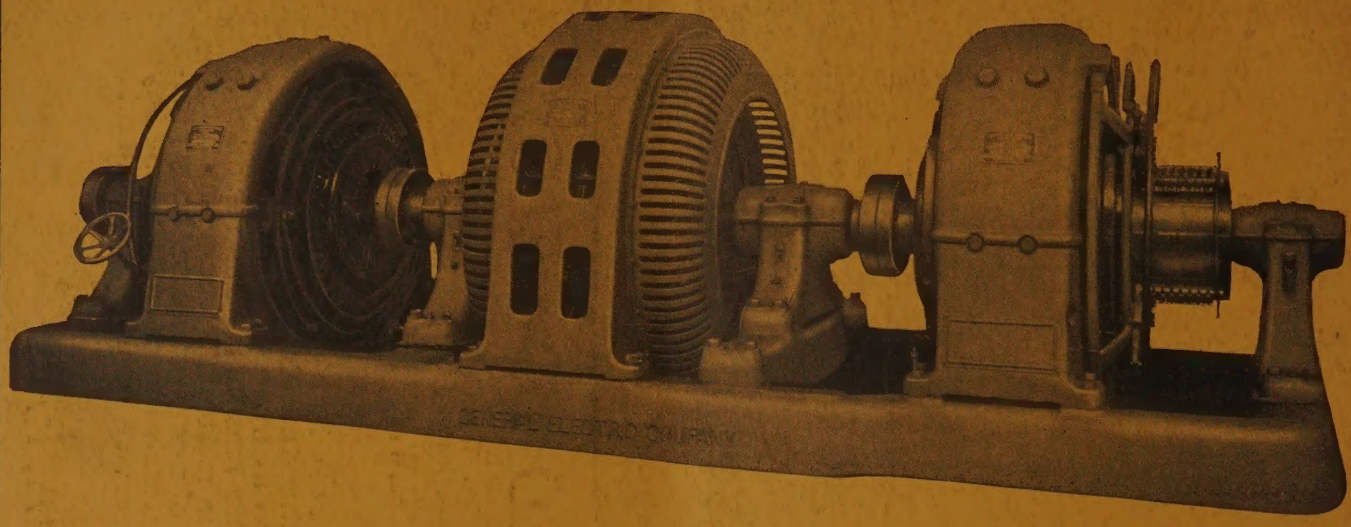
CAR ON BRILL RADIAX TRUCK *REFERRED TO BELOW*

NO PLATFORM STEPS. Track to platform, 13 in.; platform to floor, 10½ in. All steel bottom and upper framing. Wheel base of truck; 10 ft.; wheel diameter 24 in., weight of car-body and truck fully equipped, 22,140 lb., seating capacity, 41. See full description in June Brill Magazine.

The following is part of an Editorial from the August 1st issue of ELECTRIC RAILWAY JOURNAL, entitled "MODERN SINGLE-TRUCK CARS:"

"A few years ago the single-truck car seemed doomed to die a natural death except in cities which were too small to use the large double-truck cars which were becoming more and more popular. No one would have ventured to foretell that the time would come when a large city company would actually discard double-truck cars in excellent operating condition for any kind of single-truck design. Yet this is precisely what the Third Avenue Railway System, New York, has done during the current year in ordering a total of fifty single-truck cars, of which forty-nine will have radial-axle trucks. In all likelihood additional cars of the same type will be ordered as soon as more of the older double-truck cars can be sold. The reason for this remarkable change of front is largely the radial-axle truck, which has made possible the selection of a convertible car body practically 35 ft. over all, a size which the operating company believes will prove ideal for service in the northern suburbs of New York City."

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.



1200 Volts + 1200 Volts = 2400 Volts

By the simple electrical addition of two 1200 volt generators coupled to one motor, the General Electric Company has demonstrated the way to higher and more economical direct current voltages.

The above photograph of the

G-E 1000 Kw. Motor-Generator Sets

now in service on the Butte, Anaconda and Pacific Railway indicates the simplicity and flexibility of this method of obtaining power.

The generator fields are separately excited at 125 volts. The armatures are insulated for 2400 volts.

The Guaranteed Load of 300% for 5 Minutes

provides for sufficient power in all peak conditions. With this reserve capacity and high voltage, heavy trains are operated over grades with great freedom of movement without danger of overloading the generators and with minimum loss in the conductors. Heavy trains can be operated 30 miles from the sub-station if necessary, in case one sub-station is cut off temporarily. The motor is fed from the 60 cycle transmission in common with other power.

G-E motor-generators, rotary converters and engine driven units cover all voltages and frequencies of supply for the conversion of power for the entire range of voltages on direct current systems.

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